

Final

Site Investigation Report
11th Chemical Motor Pool Area,
Parcels 29(7), 30(7), and 74(7)

Fort McClellan
Calhoun County, Alabama

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See Attachment 1 - List of Acronyms and Abbreviations

Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation completed a site investigation (SI) at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) at Fort McClellan in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. The SI at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) consisted of the sampling and analyses of four surface soil samples, two depositional soil samples, ten subsurface soil samples, fourteen groundwater samples, and three surface water and sediment samples. In addition, ten groundwater monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analyses of samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) indicate that metals, volatile organic compounds, and semivolatile organic compounds (SVOC) were detected in the environmental media sampled. To evaluate whether detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for Fort McClellan.

Several metals were detected in site media (primarily surface and depositional soils) at concentrations exceeding ESVs and background concentrations. In addition, four SVOCs (anthracene, benzo[a]pyrene, fluoranthene, and pyrene) were detected in one surface soil sample, and the SVOC bis(2-ethylhexyl)phthalate was detected in one surface water sample at concentrations exceeding ESVs. The concentrations of the four SVOCs in the surface soil sample were below polynuclear aromatic hydrocarbon background screening values.

Five metals (aluminum, arsenic, chromium, iron, and manganese) were detected in surface/depositional and subsurface soils at concentrations exceeding SSSLs but within background concentrations or the range of background values. The SVOC benzo(a)pyrene was detected at a concentration exceeding the SSSL in one subsurface soil sample. Benzo(a)pyrene was not detected in any of the other subsurface soil samples. Volatile organic compound concentrations in surface/depositional and subsurface soils were below SSSLs.

The potential impact to ecological receptors is expected to be minimal based on the existing viable habitat and site conditions. The site is a well-developed area consisting of buildings and paved roads/areas interspersed with grassed areas. Viable ecological habitat is presently limited and is not expected to increase in the future land-use scenario. Consequently, the potential threat to ecological receptors is expected to be low.

In groundwater, several metals were detected at concentrations exceeding SSSLs and background concentrations. The majority of these metals were present in three samples that had high turbidity at the time of sample collection that likely influenced the results. Excluding the high turbidity samples, the concentrations of six metals (aluminum, barium, iron, manganese, thallium, and vanadium) exceeded SSSLs and background concentrations. Naphthalene and 2-methylnaphthalene were detected in one groundwater sample at concentrations exceeding SSSLs.

Localized residual contamination associated with the former underground storage tank is present in subsurface soils and groundwater at Parcels 29(7), 30(7), and 74(7). Three chemical constituents (benzo[a]pyrene, 2-methylnaphthalene, and naphthalene) were detected at concentrations exceeding residential human health SSSLs at one sample location located directly in the underground storage tank excavation area.

Based on the results of the SI completed at the 11th Chemical Motor Pool Area, IT Corporation recommends no further action with regard to additional investigation or remedial action by the U.S. Army. However, because of the presence of benzo(a)pyrene, 2-methylnaphthalene, and naphthalene in groundwater at concentrations exceeding residential human health SSSLs, the U.S. Army should consider placing restrictions on future land use that may result in human exposure to groundwater at Parcels 29(7), 30(7), and 74(7).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510 established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers, Mobile District (USACE). The USACE contracted with IT Corporation (IT) to perform the site investigation (SI) at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7), under Contract Number DACA21-96-D-0018, Task Order CK05.

This SI report presents specific information and results compiled from the SI, including field sampling and analysis and monitoring well installation activities conducted at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7).

1.1 Project Description

The 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7), was identified as an area to be investigated prior to property transfer. The 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7), was classified as a Category 7 site in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 7 sites are areas that are not evaluated and/or that require further evaluation.

A site-specific field sampling plan (SFSP) attachment and a site-specific safety and health plan (SSHP) attachment were finalized in September 1998. The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998a) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The SI included fieldwork to collect four surface soil samples, two depositional soil samples, ten subsurface soil samples, fourteen groundwater samples, three sediment samples, and three surface water samples. Data from the field investigation were used to determine whether

potential site-specific chemicals are present at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7).

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) at concentrations that would present an unacceptable risk to human health or the environment. The conclusions of the SI in Section 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs, ESVs, and polynuclear aromatic hydrocarbon (PAH) background screening values are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). The PAH background screening values were developed by IT at the direction of the BRAC Cleanup Team (BCT) to address the occurrence of PAH compounds in surface soils as a result of anthropogenic activities at FTMC. Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

Based on the conclusions presented in this SI report, the BCT will decide to propose “No Further Action” at the site or to conduct additional work at the site.

1.3 Site Description and History

The 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) is located in the central part of the Main Post at the intersection of 14th Avenue and 20th Street (Figures 1-1 and 1-2). The 11th Chemical Motor Pool Area, which covers approximately 6.28 acres, consists of three sites: Building 3299 (Parcel 29[7]), Building 3298 (Parcel 30[7]), and Building 3262 (Parcel 74[7]). The three sites were identified as Community Environmental Response Facilitation Act (CERFA) sites (see Chapter 2.0): areas where petroleum products were stored, released, and/or disposed, and/or migration of hazardous substances is suspected, but the sites are either not evaluated or require additional evaluation to determine the environmental condition.

The area around the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) consists of

housing, recreational, training, and administrative buildings. Remount Creek is located approximately 90 feet east of the site and flows south to north across the eastern border of the site. A small tributary is located approximately 800 feet west of the parcel and drains into Remount Creek to the north. The parcel is located on a nearly flat broad crest, which slopes gently to the east/northeast, and lies at an elevation of approximately 750 to 760 feet above mean sea level. The parcel is approximately 220 feet wide (east to west) by 1,140 feet long (north to south) and is bounded on all sides by chain-link fence. Shallow groundwater at the parcel is probably controlled by topography.

2.0 Previous Investigations

An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with Department of Defense guidance for fast track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)
2. Areas where only release or disposal of petroleum products has occurred
3. Areas where release, disposal, and or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response
4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken
5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken
6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented
7. Areas that are not evaluated or require additional evaluation.

The EBS was conducted in accordance with CERFA (CERFA-Public Law 102-426) protocols and Department of Defense policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historic maps and aerial photographs were reviewed to document historic land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific

property parcels. The 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) was identified as a Category 7 CERFA site: areas that are not evaluated or require further evaluation. Previous investigations have been conducted at the 11th Chemical Motor Pool Area as described in the following paragraphs.

Building 3299 (Parcel 29[7]). Building 3299 (Parcel 29[7]) is located in the southern part of the 11th Chemical Motor Pool Area (Figure 1-2). In 1953, a 10,000-gallon steel underground storage tank (UST) was installed at the site to store diesel fuel. The 10,000-gallon UST was located approximately 120 feet east of Building 3299 next to a chain-link fence (Figure 2-1). In 1986, the tank was removed and replaced with a new 10,000-gallon fiberglass UST. In November 1989, tank tightness tests revealed that the UST was leaking. The tank was emptied and removed from service (Ecology & Environment, Inc. [E&E], 1991). Analysis of soil samples collected from borings in January 1990 by Aroclor Services, Inc. indicated total recoverable petroleum hydrocarbon (TRPH) concentrations ranging from 80 to 2,000 milligrams per kilogram (mg/kg) (E&E, 1991). The analytical results of the soil samples collected by Aroclor Services, Inc. were not available. The UST and surrounding soils were removed in 1990. At that time, four monitoring wells (MW5-1, MW5-2, MW5-3, and MW5-4) were installed by the USACE to determine if any contamination associated with the tank was present (ESE, 1998). During the advancement and installation of the four monitoring wells, soil samples were collected and analyzed for TRPH. TRPH concentrations in the soil samples ranged from 5.3 to 2,718 mg/kg. Subsurface soil samples collected from the soil borings at monitoring wells MW5-3 and MW5-4 had TRPH concentrations exceeding 100 mg/kg. The highest concentration of TRPH in soil (2,718 mg/kg) was detected in monitoring well MW5-4 at a depth of 5 to 6.5 feet below ground surface (bgs). Soil sample analytical results are presented in Table 2-1.

The soil samples collected from monitoring wells MW5-3 and MW5-4 were within 5 feet of the groundwater table. ADEM's *Corrective Action Limits for Petroleum Contaminated Soil* (Rule 335-6-15) specifies that soils exhibiting concentrations greater than 100 mg/kg within 5 feet of the groundwater table may require additional investigation and/or corrective measures. Consequently, E&E initiated a preliminary investigation in 1990.

During the preliminary investigation, groundwater samples were collected from the four monitoring wells (MW5-1, MW5-2, MW5-3, and MW5-4) and analyzed for volatile organic compounds (VOC), PAHs, and lead. The groundwater sample collected from monitoring well MW5-4 contained benzene at a concentration of 8.3 micrograms per liter (µg/L), which exceeded

Table 2-1

**Summary of Soil Sample Analytical Results
1990
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Monitoring Well Number^a	Depth Interval (feet bgs)	TRPH Concentration (mg/kg)
MW5-1	5.0-6.5	88
MW5-1	10.0-11.5	57
MW5-2	5.0-6.5	73
MW5-2	10.0-11.5	78
MW5-3	5.0 - 6.5	132
MW5-3	10.0 - 11.5	112
MW5-4	5.0 - 6.5	2,718
MW5-4	10.0 - 11.5	128

^aData from soil samples collected by USACE during monitoring well Installation in 1990.

Source: Ecology & Environment, Inc., 1991, *Preliminary Investigation Report for Closure of Underground Storage Tanks, Fort McClellan, Anniston, Alabama*.

bgs - Below ground surface

mg/kg - Milligrams per kilogram

TRPH - Total recoverable petroleum hydrocarbons

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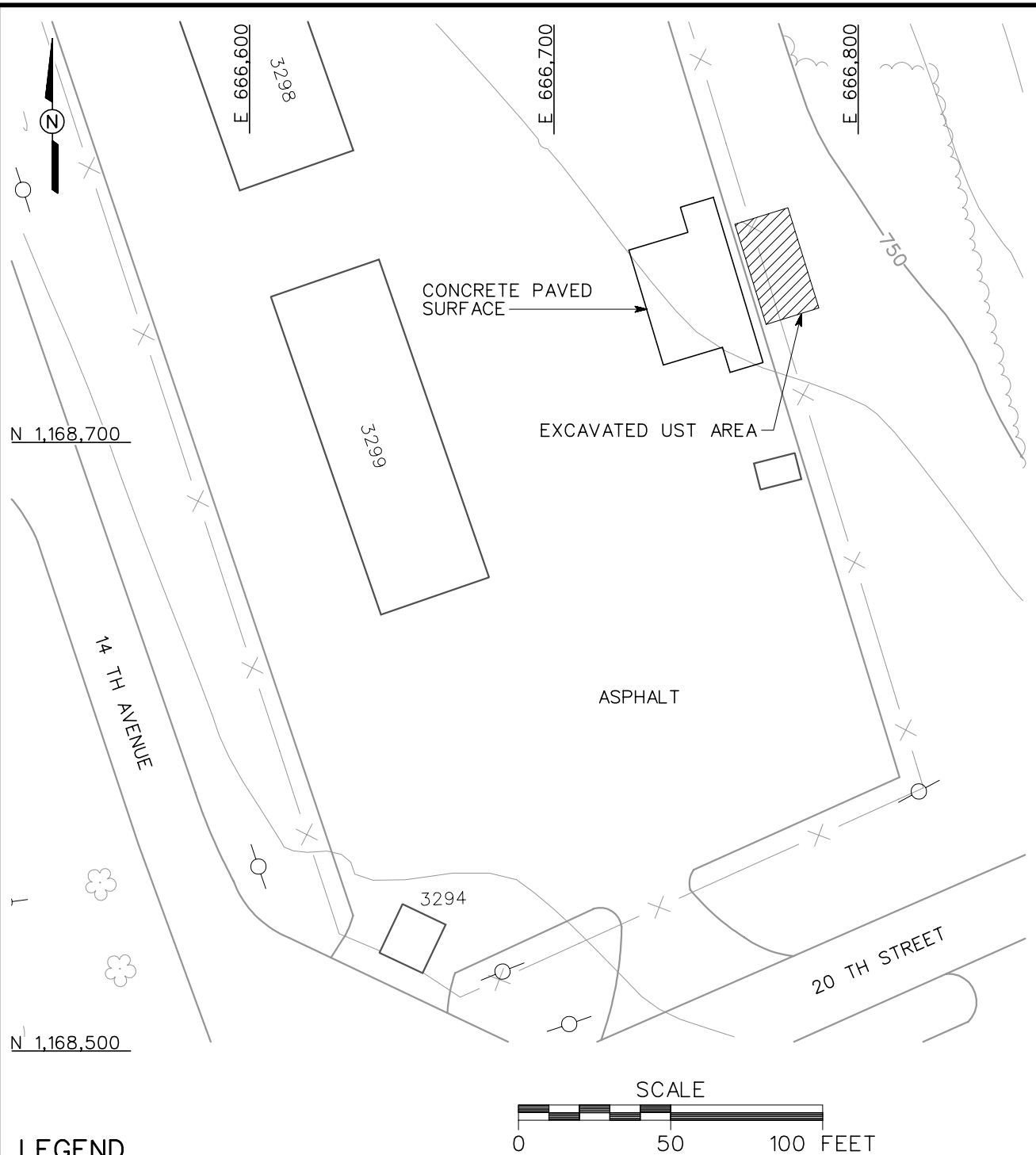


FIGURE 2-1
SITE MAP
BUILDING 3299
11th CHEMICAL MOTOR POOL AREA
PARCELS 29(7), 30(7), AND 74(7)
 U. S. ARMY CORPS OF ENGINEERS
 MOBILE DISTRICT
 FORT McCLELLAN
 CALHOUN COUNTY, ALABAMA
 Contract No. DACA21-96-D-0018

the ADEM and EPA maximum contaminant level of 5 µg/L. Benzene was detected at a concentration of 2.8 µg/L in the groundwater sample collected from monitoring well MW5-3. Lead was detected in groundwater samples collected from monitoring wells MW5-3 and MW5-4 at concentrations of 8.1 µg/L and 9.3 µg/L, respectively. PAHs were not detected in any of the groundwater samples collected.

Based on the preliminary investigation findings, a secondary investigation was recommended. The secondary investigation was performed by E&E (1992) to determine the lateral and vertical extent of soil and/or groundwater contamination as outlined in ADEM Rule 335-6-15. During the investigation, three soil borings (B5-7, B5-10, and B5-11) and two additional monitoring wells (MW5-5 and MW5-6) were installed in January 1992. During the advancement of the soil borings and installation of the two monitoring wells, soil samples were collected and analyzed for TRPH. TRPH concentrations in the soil samples ranged from 34 to 47 mg/kg. TRPH was not detected in the soil samples collected during the installation of monitoring wells MW5-5 and MW5-6. The highest concentration of TRPH in soil (47 mg/kg) was detected in boring B5-11 at a depth of 2 to 3.5 feet bgs (E&E, 1992). Soil sample analytical results are presented in Table 2-2. Groundwater samples were collected from the four monitoring wells installed during the preliminary investigation (MW5-1, MW5-2, MW5-3, and MW5-4) and from monitoring wells MW5-5 and MW5-6. Benzene was detected in monitoring wells MW5-3 and MW5-4 at concentrations of 0.89 µg/L and 5.8 µg/L, respectively. Benzene concentrations in groundwater from the preliminary (1990) and secondary (1992) investigations are shown on Figure 2-2. Lead was detected in monitoring well MW5-6 at a concentration of 16 µg/L (E&E, 1992). The results of the preliminary and secondary field investigations indicated contaminant concentrations in groundwater and soil had decreased with time. Groundwater analytical data from the preliminary and secondary investigations are presented in Table 2-3.

On January 16, 1992, E&E collected two surface water samples (SW-51 and SW-52) from Remount Creek. One surface water sample was collected immediately upstream of the site, and one surface water sample was collected downstream of the site. The samples were analyzed for VOCs, PAHs, and lead. None of the parameters analyzed for was detected in either of the samples. The locations of the surface water samples are shown on Figure 2-2.

E&E recommended “No Further Action” based on continued use as a motor pool; however, the BCT felt the site required further evaluation before transferring the property. Specifically, the BCT was concerned with the change in land use from a motor pool to residential classification.

Table 2-2

**Summary of Soil Sample Analytical Results
1992
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Monitoring Well/Boring	Depth Interval (feet bgs)	TRPH Concentration (mg/kg)
MW5-5	3-5	ND
MW5-6	2-4	ND
B5-7	2-4	ND
B5-7	4-6	ND
B5-10	4-6	43
B5-10	6-8	ND
B5-11	0-2	34
B5-11	2-3.5	47

Source: Ecology & Environment, Inc., 1992, *Secondary Investigation Report for Closure of Surplus Underground Storage Tanks, Fort McClellan, Anniston, Alabama*.

bgs - Below ground surface

mg/kg - Milligrams per kilogram

ND - Not detected

TRPH - Total recoverable petroleum hydrocarbons

Table 2-3

**Summary of Groundwater Analytical Results
Preliminary and Secondary Investigations
1990 and 1992
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Parameter	Monitoring Well Number/Concentration (µg/L)						ADEM/EPA	
							MCL	MCL
	MW5-1	MW5-2	MW5-3	MW5-4	MW5-5	MW5-6		
Benzene	ND / ND	ND / ND	2.8 / 0.89	8.3 / 5.8	NA / ND	NA / ND	5	5
Total Xylene	ND	ND	2 / ND	1.8 / 3.2	NA / ND	NA / ND		10,000
Ethyl Benzene	ND	ND	ND / 1.4	ND	NA / ND	NA / ND		700
Toluene	ND	ND	ND	ND / 0.98	NA / ND	NA / ND		1,000
MTBE	ND	ND	22 / 4.7	46 / 8	NA / ND	NA / ND		
Naphthalene	NA	NA	ND	ND	NA / ND	NA / ND		
1-Methylnaphthalene	NA	NA	ND	ND	NA / ND	NA / ND		
2-Methylnaphthalene	NA	NA	ND	ND	NA / ND	NA / ND		
Acenaphthene	NA	NA	ND	ND	NA / ND	NA / ND		
Fluoranthene	NA	NA	ND	ND	NA / ND	NA / ND		
Anthracene	NA	NA	ND	ND	NA / ND	NA / ND		
Fluorene	NA	NA	ND	ND	NA / ND	NA / ND		
Phenanthrene	NA	NA	ND	ND	NA / ND	NA / ND		
Pyrene	NA	NA	ND	ND	NA / ND	NA / ND		
Lead	NA	NA	8.1 / ND	9.3 / ND	NA / 16	NA / ND	20	15

Sources:

Ecology & Environment, Inc., 1991, *Preliminary Investigation Report for Closure of Underground Storage Tanks, Fort McClellan, Anniston, Alabama.*

Ecology & Environment, Inc., 1992, *Secondary Investigation Report for Closure of Surplus Underground Storage Tanks, Fort McClellan, Anniston, Alabama.*

Monitoring wells MW5-5 and MW5-6 installed during secondary investigation.

8.3/5.8 - 1990 preliminary investigation concentration/1992 secondary investigation concentration.

ADEM - Alabama Department of Environmental Management

EPA - U.S Environmental Protection Agency

MCL - Maximum contaminant level (µg/L)

µg/L - Micrograms per liter

NA - Not analyzed

ND - Not detected

Building 3298 (Parcel 30[7]). Building 3298 (Parcel 30[7]) is located northeast of Building 3299 (Figure 2-1). Approximately 150 feet northeast of Building 3298, positioned between two concrete truck ramps, is a 2,000-gallon steel waste oil UST (Figure 2-3). The 2,000-gallon UST was closed in place (filled with concrete) in May 1994 by Braun Intertec Corporation (Braun). A new 2,500 gallon waste oil UST was later installed about 30 feet to the southwest (Figure 2-3).

Four soil borings (one on each side) were advanced around the abandoned 2,000-gallon waste oil UST by Braun in April 1994 (Figure 2-4). Soil samples were collected at 7.5 feet bgs in each of the four soil borings and analyzed for total petroleum hydrocarbons (TPH) and total lead (Table 2-4). One soil sample was collected from the south side of the tank at 5 feet bgs. The highest TPH concentration (775 mg/kg) was detected in the south soil sample (sample number 3298-S) at a depth of 5 feet bgs. Groundwater was not encountered during the UST closure and groundwater sampling was not conducted at this site. According to the closure report, approximately 10 cubic yards of soil were removed from the tank excavation (Braun, 1995). A soil sample was collected from the excavated soil stockpile and analyzed for TPH and total lead. TPH was detected at a concentration of 2,900 mg/kg in the sample collected from the soil stockpile. The excavated soil was taken to an off-site landfill for disposal. During excavation activities, silty sand and clay were encountered at approximately 7.5 feet bgs. Shale bedrock was encountered from 7.5 to 15.5 feet bgs. The closure report concluded that a release had occurred on site; however, the vertical and horizontal extent of contamination in the soil had not been determined (Braun, 1995).

Building 3262 (Parcel 74[7]). Building 3262 (Parcel 74[7]) was built in approximately 1953 and originally had a vehicle washrack and associated baffle-type oil/water separator (OWS). The facility was rebuilt in 1991 and now has a settling basin attached to a coalescing plate OWS, which discharges to the sanitary sewer (ESE, 1998). The vehicle washrack is connected to the OWS by a concrete surface drain (Figure 2-3). The vehicle washrack and OWS were used until about September 1999.

Table 2-4

**Summary of Soil Sample Analytical Results
1994
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Soil Sample Location	TPH (mg/kg)	Total Lead (mg/kg)	Sample Depth (feet)
3298-N	85	13	7.5
3298-E	5	17	7.5
3298-S	775	9.7	5
3298-S	140	18	7.5
3298-W	20	18	7.5
Stockpile	2,900	26	NA

Source: Braun Intertec Corporation, 1995, *UST Closure, Site Assessment Report, Fort McClellan, Building 3298, Calhoun County, Alabama*, January.

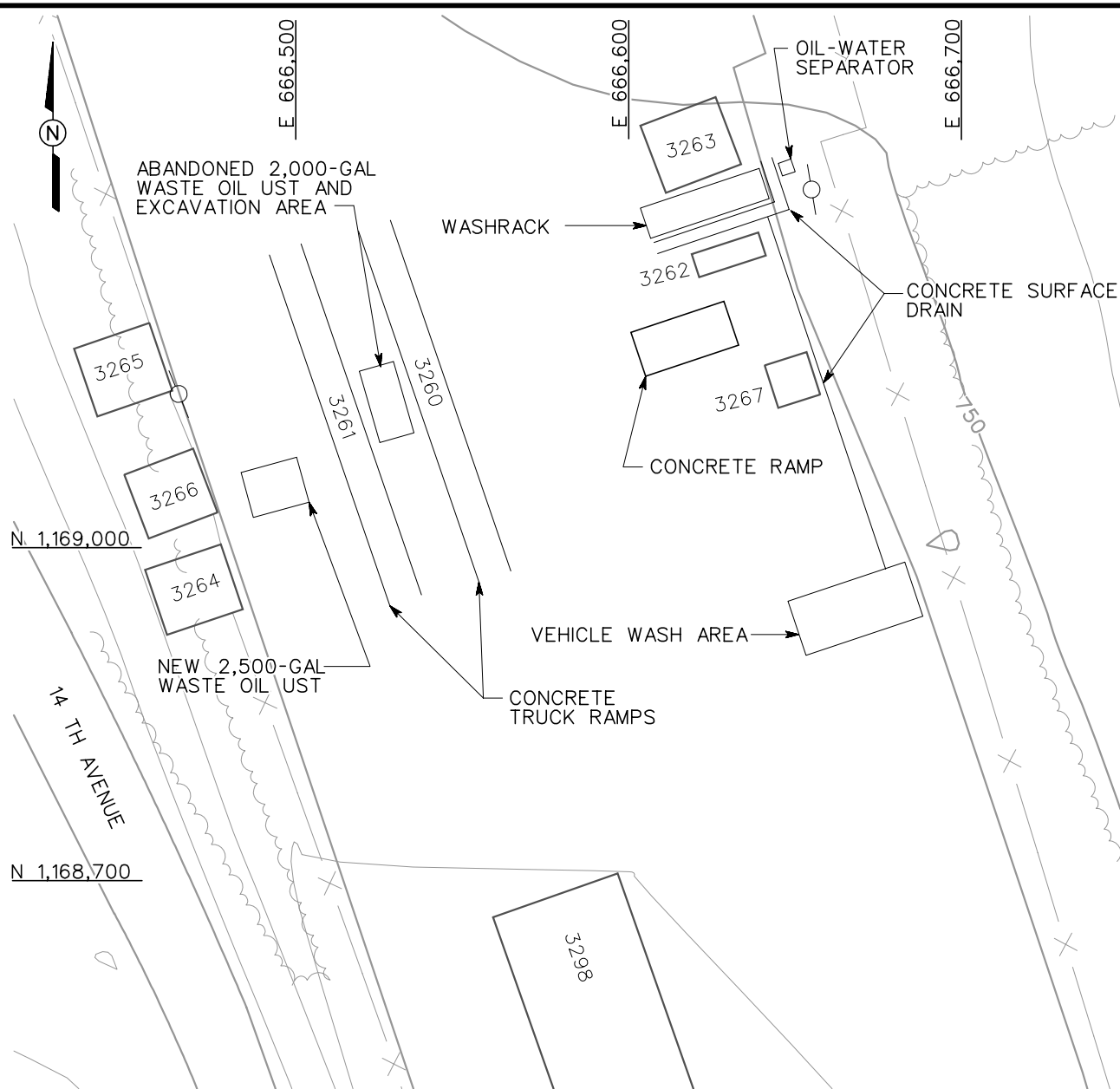
mg/kg - Milligrams per kilogram

TPH - Total petroleum hydrocarbons

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LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE

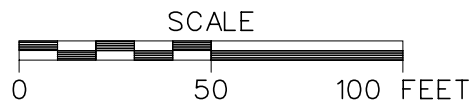


FIGURE 2-3
SITE MAP
BUILDINGS 3298 AND 3262
11th CHEMICAL MOTOR POOL AREA
PARCELS 29(7), 30(7), AND 74(7)
 U. S. ARMY CORPS OF ENGINEERS
 MOBILE DISTRICT
 FORT McCLELLAN
 CALHOUN COUNTY, ALABAMA
 Contract No. DACA21-96-D-0018

DWG. NO.: ...\\774645es.454	INITIATOR: J. JENKINS	DRAFT. CHCK. BY: J. JENKINS	DATE LAST REV.: 01/21/00	STARTING DATE: 01/21/00
PROJ. NO.: 774645	PROJ. MGR.: J. YACOB	ENGR. CHCK. BY: J. JENKINS	DRAWN BY: D. BILLINGSLEY	DRAWN BY: D. BILLINGSLEY

06/09/00
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DBILLING
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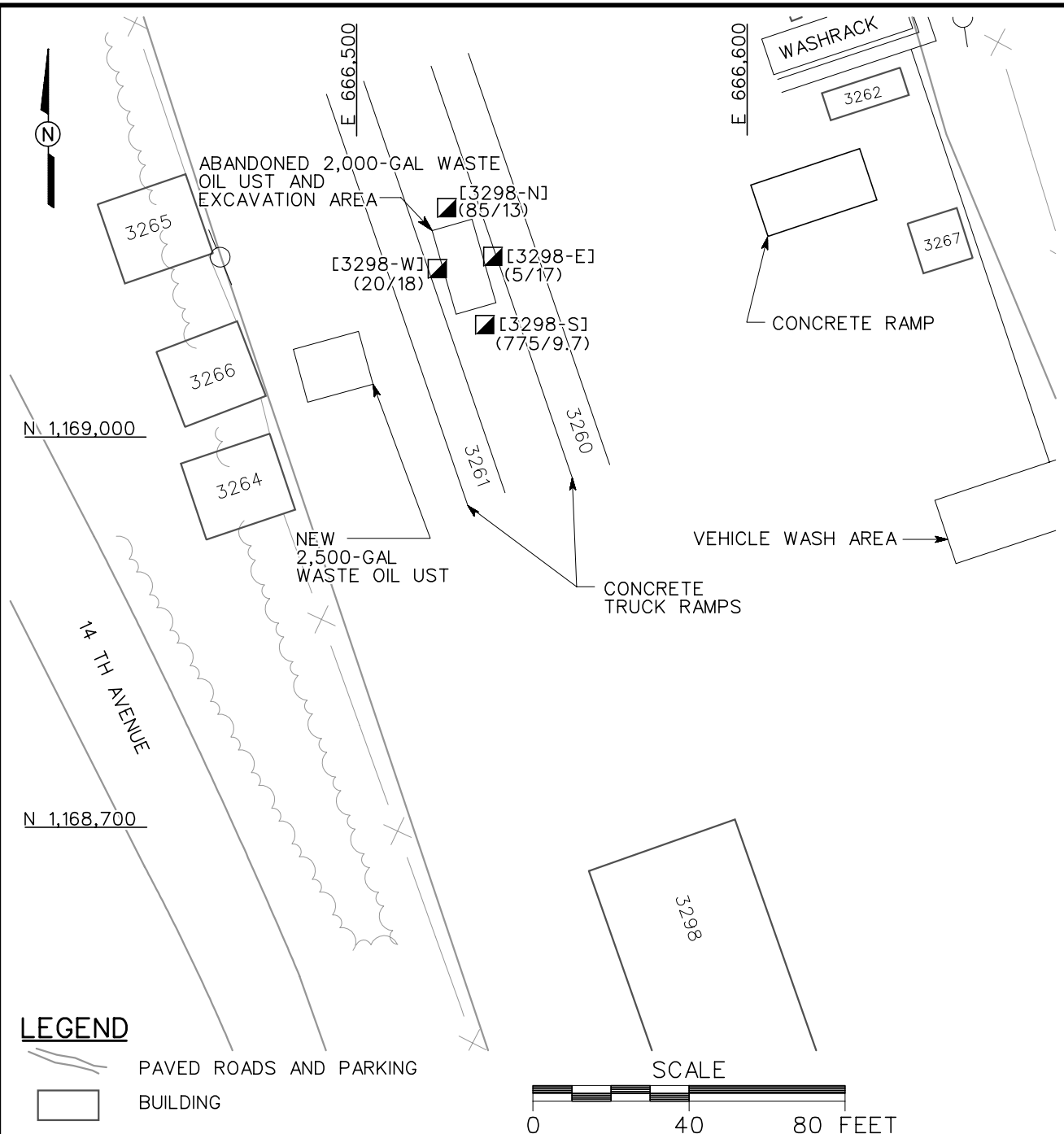


FIGURE 2-4
TOTAL PETROLEUM HYDROCARBON (TPH) AND LEAD (Pb) CONCENTRATIONS IN SOIL BUILDING 3298 (1994)
11th CHEMICAL MOTOR POOL AREA
PARCELS 29(7), 30(7), AND 74(7)
U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7), including environmental sampling and analysis and groundwater monitoring well installation activities.

3.1 Environmental Sampling

The environmental sampling performed during the SI at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) included the collection of surface and depositional soil samples, subsurface soil samples, surface water and sediment samples, and groundwater samples for chemical analysis. The sample locations were determined by observing site physical characteristics noted during a site walk over and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analyses of site-related parameters listed in Section 3.3.

3.1.1 Surface and Depositional Soil Sampling

Surface soil samples were collected from four locations and depositional soil samples were collected from two locations at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Soil sampling locations and rationale are presented in Table 3-1. Sampling locations are shown on Figure 3-1. Sample designations and quality assurance/quality control (QA/QC) samples are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried utilities.

Sample Collection. Surface soil samples were collected from the upper 1 foot of soil with a 3-inch diameter stainless-steel hand auger using the methodology specified in Section 4.9 of the SAP (IT, 2000a). Depositional soil samples were collected from the upper 1 foot of soil with a stainless-steel trowel or spoon. Surface and depositional soil samples were collected by first removing surface debris, such as rocks and vegetation, from the immediate sample area. The soil was collected with the sampling device and screened with a photoionization detector (PID) in accordance with Section 4.7.1.1 of the SAP (IT, 2000a). Samples for VOC analyses were collected directly from the sampler with three EnCore[®] samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the

Table 3-1

**Sampling Locations and Rationale
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Media	Sample Location Rationale
FTA-29-GP01	Surface Soil Subsurface Soil Groundwater	Surface soil, subsurface soil and groundwater samples were collected near the drain outside the fenced area in the northeast corner of the site.
FTA-29-GP02	Surface Soil Subsurface Soil Groundwater	Surface soil, subsurface soil and groundwater samples were collected in the center of the removed underground storage tank (UST) excavation area along the fence near the eastern border of the site.
FTA-29-GP03(SS) FTA-29-GP03(W)	Surface Soil Subsurface Soil Groundwater	Surface soil, subsurface soil and groundwater samples were collected in the vicinity of the abandoned waste oil tank excavation area located between the concrete truck ramps 3260 and 3261.
FTA-29-GP04	Surface Soil Subsurface Soil Groundwater	Surface soil, subsurface soil and groundwater samples were collected in the grassy area between the washrack and the oil/water (O/W) separator, northeast of Building 3262
FTA-29-GP05	Subsurface Soil Groundwater	Subsurface soil and groundwater samples were collected downgradient of the removed UST excavation area near Remount Creek.
FTA-29-GP06	Subsurface Soil Groundwater	Subsurface soil and groundwater samples were collected upgradient of Building 3299 and the UST excavation area approximately 20 feet west of Building 3299.
FTA-29-GP07	Subsurface Soil Groundwater	Subsurface soil and groundwater samples were collected approximately 50 feet north of FTA-29-GP03 between the concrete truck ramps 3260 and 3261.
FTA-29-GP08	Subsurface Soil Groundwater	Subsurface soil and groundwater samples were collected approximately 50 feet south of FTA-29-GP03 between the concrete truck ramps 3260 and 3261.
FTA-29-GP09	Subsurface Soil Groundwater	Subsurface soil and groundwater samples were collected downgradient of the O/W separator and washrack approximately 60 feet northeast of Building 3262 in the grassy area outside the fence.
FTA-29-GP10(SS) FTA-29-GP10(W)	Subsurface Soil Groundwater	Subsurface soil and groundwater samples were collected adjacent to the concrete drain line in the grassy area inside the fence near Buildings 3262 and 3267.
FTA-29-MW02	Groundwater	A groundwater sample was collected from existing perimeter monitoring well MW5-2, located approximately 60 feet cross-gradient (south) of the 10,000-gallon UST tank excavation area.
FTA-29-MW03	Groundwater	A groundwater sample was collected from existing monitoring well MW5-3 located in the 10,000-gallon tank excavation area.
FTA-29-MW04	Groundwater	A groundwater sample was collected from existing monitoring well MW5-4, located in the northeast corner of the 10,000-gallon tank excavation area.
FTA-29-MW05	Groundwater	A groundwater sample was collected from existing monitoring well MW5-5, located approximately 60 feet north of the 10,000-gallon tank excavation area in the grass.
FTA-29-SW/SD01	Surface Water Sediment	Surface water and sediment samples were collected from Remount Creek, which receives surface runoff from the parcel.
FTA-29-SW/SD02	Surface Water Sediment	Surface water and sediment samples were collected from Remount Creek, which receives surface runoff from the parcel.
FTA-29-SW/SD03	Surface Water Sediment	Surface water and sediment samples were collected from Remount Creek, which receives surface runoff from the parcel.
FTA-29-DEP01	Depositional Soil	A depositional soil sample was collected from a lower elevation at the site.
FTA-29-DEP02	Depositional Soil	A depositional soil sample was collected from a lower elevation at the site.

Table 3-2

**Surface Soil, Subsurface Soil, and Depositional Soil Sample Designations and QA/QC Samples
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
FTA-29-GP01	FTA-29-GP01-SS-AA0001-REG	0-1				TCL VOCs, TCL SVOCs
	FTA-29-GP01-DS-AA0002-REG	4.5-9				TAL Metals
FTA-29-GP02	FTA-29-GP02-SS-AA0003-REG	0-1	FTA-29-GP02-SS-AA0004-FD	FTA-29-GP02-SS-AA0005-FS		TCL VOCs, TCL SVOCs
	FTA-29-GP02-DS-AA0006-REG	5-8				TAL Metals
FTA-29-GP03(SS)	FTA-29-GP03-SS-AA0007-REG	0-1			FTA-29-GP03-SS-AA0007-MS	TCL VOCs, TCL SVOCs
	FTA-29-GP03-DS-AA0008-REG	1-3			FTA-29-GP03-SS-AA0007-MSD	TAL Metals
FTA-29-GP04	FTA-29-GP04-SS-AA0009-REG	0-1				TCL VOCs, TCL SVOCs
	FTA-29-GP04-DS-AA0010-REG	5-10				TAL Metals
FTA-29-GP05	FTA-29-GP05-DS-AA0011-REG	8-10				TCL VOCs, TCL SVOCs
						TAL Metals
FTA-29-GP06	FTA-29-GP06-DS-AA0012-REG	4-8				TCL VOCs, TCL SVOCs
						TAL Metals
FTA-29-GP07	FTA-29-GP07-DS-AA0013-REG	8-10				TCL VOCs, TCL SVOCs
						TAL Metals
FTA-29-GP08	FTA-29-GP08-DS-AA0014-REG	8-10				TCL VOCs, TCL SVOCs
						TAL Metals
FTA-29-GP09	FTA-29-GP09-DS-AA0015-REG	4-8			FTA-29-GP09-DS-AA0015-MS	TCL VOCs, TCL SVOCs
					FTA-29-GP09-DS-AA0015-MSD	TAL Metals
FTA-29-GP10(SS)	FTA-29-GP10-DS-AA0016-REG	4-5	FTA-29-GP10-DS-AA0017-FD			TCL VOCs, TCL SVOCs
						TAL Metals
FTA-29-DEP01	FTA-29-DEP01-DEP-AA1004-REG	0-1				TCL VOCs, TCL SVOCs
						TAL Metals
FTA-29-DEP02	FTA-29-DEP02-DEP-AA1005-REG	0-1				TCL VOCs, TCL SVOCs
						TAL Metals

FD - Field duplicate

FS - Field split

ft. bgs - feet below ground surface

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample

SVOC - Semivolatile organic compound.

TAL - Target analyte list.

TCL - Target compound list.

VOC - Volatile organic compound.

appropriate sample containers. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3. Sample collection logs are included in Appendix A.

3.1.2 Subsurface Soil Sampling

Subsurface soil samples were collected from ten soil borings at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7), as shown on Figure 3-1. Subsurface sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and QA/QC samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried and overhead utilities. IT contracted TEG, Inc., a direct-push technology subcontractor, to assist in subsurface soil sample collection.

Sample Collection. Subsurface soil samples were collected from soil borings at a depth greater than 1 foot bgs in the unsaturated zone. The soil borings were advanced and soil samples collected using the direct-push sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3.

Subsurface soil samples were collected continuously to 12 feet bgs or until direct-push sampler refusal was encountered. Samples were field screened using a PID in accordance with Section 4.7.1.1 of the SAP (IT, 2000a) to measure for volatile organic vapors. The sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were not greater than background, the deepest sample interval above the saturated zone was submitted for analyses. Samples to be analyzed for VOCs were collected directly from the sampler with three EnCore[®] samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Samples submitted for laboratory analyses are summarized in Table 3-2. The on-site geologist constructed a detailed boring log for each soil boring. The lithological log for each borehole is included in Appendix B.

At the completion of soil sampling, boreholes were abandoned with bentonite chips and hydrated with potable water following borehole abandonment procedures summarized in Appendix B of the SAP (IT, 2000a).

3.1.3 Well Installation

Ten temporary wells were installed in the residuum groundwater zone at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) to collect groundwater samples for laboratory analyses. The well/groundwater sampling locations are shown on Figure 3-1. Table 3-3 summarizes construction details of the wells installed at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The well construction logs are included in Appendix B.

Three of the temporary wells (FTA-29-GP01, FTA-29-GP04, and FTA-29-GP09) were installed by TEG, Inc. using direct-push technology. The direct-push temporary wells were installed by advancing a 2-inch outside diameter direct-push sampler to 12 feet bgs or until direct-push sampler refusal was encountered. The direct-push sampler was removed from the borehole and a 5-foot length of 1-inch inside diameter (ID), 0.010-inch, factory-slotted Schedule 40 polyvinyl chloride (PVC) screen with a 1-inch PVC end cap was placed at the bottom of the borehole and attached to 1-inch ID, flush-threaded Schedule 40 PVC riser. A number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was placed in the annular space of the borehole around the screen from the bottom of the borehole to approximately 1 foot above the top of the screen. A seal was created from the top of the filter sand to the ground surface by placing bentonite chips in the annular space and hydrating with potable water. Following groundwater sampling, the direct-push temporary wells were abandoned by removing the PVC riser and screen from the borehole and adding bentonite chips to ground surface and hydrating with potable water. Well abandonment procedures followed guidelines outlined in Appendix C of the SAP (IT, 2000a).

IT contracted Miller Drilling, Inc. to install the remaining temporary wells with a hollow-stem auger rig in December 1998 at the well locations shown on Figure 3-1. IT attempted to install temporary wells at the locations where direct-push soil samples were collected. However, at locations where this was not possible because of rig access issues and overhead and underground utilities, the temporary well location was offset from the soil boring location. The soil sampling location was identified with “(SS)” and the associated temporary well location was identified with “(W)”. The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The boreholes at these locations were advanced with a 4.25-inch ID hollow-stem auger from ground surface to the first water-bearing zone in residuum at the well location. The borehole was augered to the depth of direct-push sampler refusal and samples were collected from the depth of direct-push refusal to the bottom of the borehole. A 2-foot long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for

Table 3-3

**Temporary Well Construction Summary
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Temporary Well	Northing	Easting	Ground Elevation (ft msl)	TOC Elevation (ft msl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
FTA-29-GP01*	1169629.781	666628.938	741.03	WA	9.0	5	4.00 - 9.00	1" ID Sch. 40 PVC
FTA-29-GP02	1168756.530	666776.831	754.82	755.80	10.0	5	4.75 - 9.75	2" ID Sch. 40 PVC
FTA-29-GP03(W)	1169055.158	666551.123	755.47	757.27	38.0	10	27.75 - 37.75	2" ID Sch. 40 PVC
FTA-29-GP04*	1169161.166	666659.556	750.88	WA	10.0	5	5.00 - 10.00	1" ID Sch. 40 PVC
FTA-29-GP05	1168774.547	666801.196	751.24	754.32	14.6	10	4.35 - 14.35	2" ID Sch. 40 PVC
FTA-29-GP06	1168645.579	666631.344	761.92	763.71	32.0	10	21.75 - 31.75	2" ID Sch. 40 PVC
FTA-29-GP07	1169074.232	666519.055	756.74	759.17	29.5	10	19.25 - 29.25	2" ID Sch. 40 PVC
FTA-29-GP08	1169024.503	666535.403	757.13	759.13	38.0	10	27.75 - 37.75	2" ID Sch. 40 PVC
FTA-29-GP09*	1169213.726	666704.954	748.58	WA	10.0	5	5.00 - 10.00	1" ID Sch. 40 PVC
FTA-29-GP10(W)	1169069.146	666645.244	752.66	753.47	14.0	10	3.75 - 13.75	2" ID Sch. 40 PVC

Temporary wells installed using hollow-stem auger, except as noted by *.

* Temporary well installed using direct-push technology.

Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum (NAD83), 1983.

Elevations were referenced to the North American Vertical Datum of 1988 (NAVD88).

1" ID Sch. 40 PVC - 1-inch inside diameter, Schedule 40, polyvinyl chloride.

2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.

bgs - Below ground surface.

ft - Feet

msl - Mean sea level.

TOC - Top of casing.

WA - Well abandoned.

observing and describing lithology. Where split-spoon refusal was encountered, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist logging the auger boreholes at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) continued the detailed lithological log for each borehole from the depth of split-spoon refusal to the bottom of the auger borehole by logging the auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geologic and hydrogeologic information. The lithological log for each borehole is included in Appendix B.

Upon reaching the target depth, a 5- or 10-foot length of 2-inch ID, 0.010-inch machine-slotted, Schedule 40 PVC screen with a 3-inch PVC end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 2 feet above the top of the well screen as the augers were removed. The wells were surged approximately 10 minutes, or until no more settling of the filter sand occurred inside the borehole. A bentonite seal, consisting of approximately 2 feet of bentonite chips, was placed immediately on top of the filter sand and hydrated with potable water. A locking well cap was placed on the PVC well casing. The temporary well surface completion included attaching plastic sheeting around the PVC riser using duct tape. Additionally, sand bags were used to secure the sheeting to the ground surface around the temporary well.

The 2-inch diameter temporary wells that were installed using hollow-stem augers were developed by surging and pumping with a submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). Development continued until the water turbidity was less than or equal to 20 nephelometric turbidity units (NTU) or for a maximum of four hours. The well development logs for the 2-inch temporary wells are included in Appendix C.

3.1.4 Water Level Measurements

The depth to groundwater was measured in seven temporary wells and four existing wells at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) in March 2000 following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Water level measurements were not taken at the direct-push wells (FTA-29-GP01, FTA-29-GP04, and FTA-29-GP09); these wells

Table 3-4

**Groundwater Elevations
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Well Location	Date	Depth to Water (ft btoc)	Top of Casing Elevation (ft msl)	Ground Elevation (ft msl)	Groundwater Elevation (ft msl)
FTA-29-GP02	14-Mar-00	5.24	755.80	754.82	750.56
FTA-29-GP03(W)	14-Mar-00	8.69	757.27	755.47	748.58
FTA-29-GP05	14-Mar-00	7.91	754.32	751.24	746.41
FTA-29-GP06	14-Mar-00	4.87	763.71	761.92	758.84
FTA-29-GP07	14-Mar-00	10.55	759.17	756.74	748.62
FTA-29-GP08	14-Mar-00	10.33	759.13	757.13	748.80
FTA-29-GP10(W)	14-Mar-00	7.52	753.47	752.66	745.95
FTA-29-MW02	14-Mar-00	4.41	755.40	755.89	750.99
FTA-29-MW03	14-Mar-00	3.61	753.12	753.57	749.51
FTA-29-MW04	14-Mar-00	3.73	753.00	753.22	749.27
FTA-29-MW05	14-Mar-00	5.43	753.34	753.59	747.91

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

ft - Feet

btoc - Below top of casing

msl - Mean sea level.

had been previously abandoned. Depth to groundwater was measured with an electronic water level meter. The meter probe and cable were cleaned between use at each well following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000a). Measurements were referenced to the top of the PVC casing. A summary of groundwater level measurements is presented in Table 3-4. For the purpose of the SI, existing monitoring wells MW5-1 through MW5-6 (Figure 2-2) were redesignated FTA-29-MW01 through FTA-29-MW06, respectively.

3.1.5 Groundwater Sampling

Groundwater was sampled from ten temporary wells and four existing wells at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Well FTA-29-MW06 was not sampled as scheduled because the well was damaged by utilities workers prior to the groundwater sampling event. The well/groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC samples are listed in Table 3-5.

Sample Collection. Groundwater sampling was completed at the direct-push temporary well locations (FTA-29-GP01, FTA-29-GP04, and FTA-29-GP09) following methodology outlined in Section 4.7 of the SAP (IT, 2000a). At these locations, groundwater was sampled using a peristaltic pump equipped with Teflon[™] tubing. Groundwater sampling was performed at the remaining temporary and existing monitoring well locations following procedures outlined in Section 4.9.1.4 of the SAP (IT, 2000a). Groundwater was sampled after purging a minimum three well volumes and field parameters including temperature, pH, specific conductivity, oxidation-reduction potential, and turbidity stabilized. Purging and sampling were performed using either a submersible pump with Teflon[™] tubing or a peristaltic pump with Teflon tubing. Field parameters were measured using a calibrated water quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.3.

3.1.6 Surface Water Sampling

Three surface water samples were collected from Remount Creek along the eastern boundary of the parcel to determine if site activities had impacted the creek. The surface water sample locations are shown on Figure 3-1. Surface water and sediment sampling was conducted in the following sequence: downstream surface water, downstream sediment, upstream surface water and, upstream sediment. This sampling sequence prevented possible cross contamination caused by disturbing the sediment during the sampling. The surface water sampling locations and

Table 3-5

**Groundwater Sample Designations and QA/QC Samples
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Depth (ft btoc)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
FTA-29-GP01	FTA-29-GP01-GW-AA3001-REG	4.36-9.84				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP02	FTA-29-GP02-GW-AA3002-REG	7.08-10.1				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP03(W)	FTA-29-GP03-GW-AA3003-REG	15.42-42.85				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP04	FTA-29-GP04-GW-AA3004-REG	7.46-9.88				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP05	FTA-29-GP05-GW-AA3005-REG	8.25-14.88				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP06	FTA-29-GP06-GW-AA3006-REG	26.85-34.6				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP07	FTA-29-GP07-GW-AA3020-REG	12.95-32.45				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP08	FTA-29-GP08-GW-AA3008-REG	14.22-42.9				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP09	FTA-29-GP09-GW-AA3009-REG	5.22-14.98	FTA-29-GP09-GW-AA3010-FD	FTA-29-GP09-GW-AA3011-FS		TCL VOCs, TCL SVOCs TAL Metals
FTA-29-GP10(W)	FTA-29-GP10-GW-AA3012-REG	10.22-15.2				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-MW02	FTA-29-MW02-GW-AA3013-REG	11.21-14.4				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-MW03	FTA-29-MW03-GW-AA3014-REG	10.38-14.1	FTA-29-MW03-GW-AA3015-FD	FTA-29-MW03-GW-AA3016-FS	FTA-29-MW03-GW-AA3014-MS FTA-29-MW03-GW-AA3014-MSD	TCL VOCs, TCL SVOCs TAL Metals
FTA-29-MW04	FTA-29-MW04-GW-AA3017-REG	10.1-12.03				TCL VOCs, TCL SVOCs TAL Metals
FTA-29-MW05	FTA-29-MW05-GW-AA3018-REG	9.65-12.15				TCL VOCs, TCL SVOCs TAL Metals

FD - Field duplicate.

FS - Field split.

ft btoc - Feet below top of casing.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

SVOC - Semivolatile organic compound.

TAL - Target analyte list.

TCL - Target compound list.

VOC - Volatile organic compound.

Table 3-6

**Groundwater and Surface Water Field Parameters
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Date	Media	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Temperature (°C)	Turbidity (NTUs)	pH (SU)
FTA-29-GP01	20 & 21-OCT-98 ^A	GW	0.454	2.06	-31	24.81	NR (>1000)	6.99
FTA-29-GP02	16-DEC-98	GW	0.254	0.24	-154	18.45	814.80	9.85
FTA-29-GP03(W)	14-DEC-98	GW	0.576	0.11	-105	20.34	0.00	6.97
FTA-29-GP04	21-OCT-98	GW	0.785	4.36	-65	24.49	NR (<100)	6.73
FTA-29-GP05	15-DEC-98	GW	0.497	0.28	-87	16.34	>1000	6.65
FTA-29-GP06	04-DEC-98	GW	0.364	0.35	-53	23.70	791.60	7.36
FTA-29-GP07	08-DEC-98	GW	0.681	0.11	-132	22.67	15.60	6.99
FTA-29-GP08	14-DEC-98	GW	0.470	0.18	-140	20.59	0.00	7.09
FTA-29-GP09	08-OCT-98	GW	0.710	1.57	-26	22.40	NR (<100)	6.36
FTA-29-GP10(W)	14-DEC-98	GW	0.663	1.04	-47	19.93	9.70	6.60
FTA-29-MW02	09-NOV-98	GW	0.272	1.35	165	22.02	39.40	6.19
FTA-29-MW03	10-NOV-98	GW	0.395	1.14	-89	20.72	28.00	6.78
FTA-29-MW04	9 & 17-NOV-98 ^B	GW	0.464	4.12	-75	20.71	14.00	6.84
FTA-29-MW05	10-NOV-98	GW	0.347	0.90	-70	20.73	19.00	6.58
FTA-29-SW/SD01	20-OCT-98	SW	0.235	7.16	158	19.16	1.25	6.25
FTA-29-SW/SD02	20-OCT-98	SW	0.235	8.14	231	19.45	1.30	7.14
FTA-29-SW/SD03	20-OCT-98	SW	0.257	8.58	220	21.15	2.10	7.40

mS/cm - Milliesiemen per centimeter.

mg/L - Milligram per liter.

mV - Millivolts.

°C - Degrees Celsius.

NTUs - Nephelometric turbidity units.

SU - Standard units.

GW - Groundwater.

SW - Surface water.

NR - Not recorded because of equipment malfunction; estimated turbidity given in parentheses.

^A - SVOCs and Metals collected on 9 Nov. 98 (parameters from 9 Nov. 98). VOCs collected on 17 Nov. 98.

^B - VOCs collected on 20 Oct. 98. SVOCs and Metals collected on 21 Oct. 98 (parameters from 21 Oct. 98).

Table 3-7

Surface Water and Sediment Sample Designations
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft bgs)	QA/QC Samples ^a			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
FTA-29-SW/SD01	FTA-29-SW/SD01-SW-AA2001-REG	NA				TCL VOCs, TCL SVOCs, TAL Metals TOC, Grain Size (sediment only)
	FTA-29-SW/SD01-SD-AA1001-REG	0-0.5				
FTA-29-SW/SD02	FTA-29-SW/SD02-SW-AA2002-REG	NA				TCL VOCs, TCL SVOCs, TAL Metals TOC, Grain Size (sediment only)
	FTA-29-SW/SD02-SD-AA1002-REG	0-0.5				
FTA-29-SW/SD03	FTA-29-SW/SD03-SW-AA2003-REG	NA				TCL VOCs, TCL SVOCs, TAL Metals TOC, Grain Size (sediment only)
	FTA-29-SW/SD03-SD-AA1003-REG	0-0.5				

^aNo QA/QC samples specified in the site-specific field sampling plan.

FD - Field duplicate

FS - Field split

ft bgs - Feet below ground surface

MS/MSD - Matrix spike/matrix spike duplicate

QA/QC - Quality assurance/quality control

REG - Field sample

SVOC - Semivolatile organic compound

TAL - Target analyte list

TCL - Target compound list

TOC - Total organic carbon

VOC - Volatile organic compound

rationale are listed in Table 3-1. The surface water sample designations are listed in Table 3-7. The sampling locations were determined in the field, based on drainage pathways and actual field observations.

Sample Collection. Surface water samples were collected in accordance with the procedures specified in Section 4.9.1.3 of the SAP (IT, 2000a). The samples were collected by dipping a stainless-steel pitcher in the water and pouring the water into the appropriate sample containers. The samples were collected after the field parameters described in Section 3.1.5 had been measured. Field parameters were measured using a Hydrolab[®] water quality unit. The field parameter readings are presented in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-7 using methods outlined in Section 3.3.

3.1.7 Sediment Sampling

Three sediment samples were collected from Remount Creek at the same locations as the surface water samples presented in Section 3.1.6 (Figure 3-1). The sediment sampling locations and rationale are listed in Table 3-1. The sediment sample designations are listed in Table 3-7. The sampling locations were determined in the field, based on drainage pathways and actual field observations.

Sample Collection. Sediment samples were collected in accordance with the procedures outlined in Section 4.9.1.2 of the SAP (IT, 2000a). Samples were collected from the upper 0.5-foot of sediment with a stainless-steel trowel. Sediment to be analyzed for VOCs was collected directly from the trowel using three EnCore[®] samplers. The remaining portion of the sediment was transferred to a stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-7 using methods outlined in Section 3.3.

3.2 Surveying of Sample Locations

New and existing sample locations (except FTA-29-MW06) were surveyed using global positioning system survey techniques described in Section 4.3 of the SAP (IT, 2000a), and conventional civil survey techniques described in Section 4.19 of the SAP (IT, 2000a). Well FTA-29-MW06 was not surveyed because the well was damaged before surveying was completed. Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum, 1983. Elevations were referenced to the North

American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

3.3 Analytical Program

Samples collected during the SI were analyzed for various physical and chemical properties. The specific suite of analyses performed was based on the potential site-specific chemicals historically at the site and EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) included the following:

- Target Compound List VOCs - Method 5035/8260B
- Target Compound List Semivolatile Organic Compounds (SVOC) - Method 8270C
- Target Analyte List Metals - Method 6010B/7000
- Total Organic Carbon (TOC) – Method 9060 (sediment only)
- Grain size – American Society for Testing and Materials D421/D422 (sediment only).

The samples were analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 6-1 in Appendix B of the SAP (IT, 2000a). Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of Appendix B of the SAP [IT, 2000a]). Chemical data were reported via hard copy data packages by the laboratory using Contract Laboratory Program-like forms. These packages were validated in accordance with EPA National Functional Guidelines by Level III criteria. A summary of validated data is included in Appendix E. The Data Validation Summary Report is included as Appendix F.

3.4 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in Section 4.13.2 of the SAP (IT, 2000a). Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in Section 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain-of-custody were recorded as specified in Section 4.13 of the SAP (IT, 2000a).

Completed analysis request and chain-of-custody records (Appendix A) were secured and included with each shipment of sample coolers to Quanterra Environmental Services in

Knoxville, Tennessee. Split samples were shipped to USACE South Atlantic Division Laboratory in Marietta, Georgia.

3.5 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated from the field sampling at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7), was segregated as follows:

- Drill cuttings
- Purge water from well development and sampling activities, and decontamination fluids
- Spent well materials, and personal protective equipment (PPE).

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined roll-off bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analyses. Based on the results, drill cuttings, spent well materials, and personal protective equipment generated during the SI at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

Liquid IDW was contained in the existing 20,000-gallon sump associated with the Building T-338 vehicle washrack. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment plant on the Main Post.

3.6 Variances/Nonconformances

This section describes the variances and nonconformances to the SFSP that occurred during completion of the SI at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7).

3.6.1 Variances

Three variances to the SFSP were recorded during completion of the SI at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The variances did not alter the intent of the investigation or the sampling rationale presented in Table 4-2 of the SFSP (IT, 1998b). The variances to the SFSP are summarized in Table 3-8 and included in Appendix G.

Table 3-8

**Variances to the Site-Specific Field Sampling Plan
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama**

Variance to the SFSP	Justification for Variance	Impact to Site Investigation
Temporary well FTA-29-GP10 was relocated approximately 40 feet southwest of direct-push soil boring location FTA-29-GP10.	Hollow-stem auger rig could not access direct-push location because of overhead power lines.	Relocation of FTA-29-GP10 allowed well completion with sufficient water for development and sampling.
Direct-push wells proposed but not installed: FTA-29-GP02, FTA-29-GP03, FTA-29-GP06, and FTA-29-GP10. Wells were installed with a hollow-stem auger rig.	Groundwater was not encountered during drilling operations with direct-push technology.	None. Drilling with hollow-stem auger rig allowed well completion and sufficient water for development and sampling.
Temporary well FTA-29-GP03 was relocated approximately 20 feet east of direct-push soil boring FTA-29-GP03.	Hollow-stem auger rig could not access direct-push location because of underground waste oil tank and utility line.	Relocation of FTA-29-GP03 allowed well completion with sufficient water for development and sampling.

3.6.2 Nonconformances

There were not any nonconformances to the SFSP recorded during completion of the SI at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7).

3.7 Data Quality

The field sample analytical data are presented in tabular form in Appendix E. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the SI work plan; the FTMC SAP and QAP; and standard, accepted methods and procedures. Sample collection logs pertaining to the collection of these samples were reviewed and organized for this report and are included in Appendix A. As discussed in Section 3.6, three variances to the SFSP were recorded during completion of the SI. However, the variances did not impact the usability of the data.

Data Validation. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F consists of a data validation summary report that was prepared to discuss the results of the validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management SystemTM database for tracking and reporting. The qualified data were used in the comparison to the SSSLs and ESVs developed by IT. Rejected data (assigned an “R” qualifier) were not used in comparison to the SSSLs and ESVs. The data presented in this report, except where qualified, meet the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) provided soil, bedrock, and groundwater data. These data were used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold and thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold and thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted with major structures and faults striking in a northeast-southwest direction.

Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and DeJarnette (1992), and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and

conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated, greenish-gray and black mudstone makes up the Nichols Formation with thin interbeds of siltstone and very fine-grained sandstone (Szabo et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The coarse-grained facies appear to dominate the unit and consist primarily of coarse-grained, vitreous quartzite, and friable, fine- to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consist of sandy and micaceous shale and silty, micaceous mudstone which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east and southwest of the Main Post and consists of interlayered bluish-gray or pale yellowish-gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne, 1999).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish-red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962), (Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark-gray, finely to coarsely crystalline medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in

Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded to laminated, siliceous dolomite and dolomitic limestone that weathers to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone is comprised of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped together as undifferentiated at FTMC and other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark-gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites and limestones, and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish-gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Szabo et al., 1988). This unit locally occurs in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark- to light-gray limestone with abundant chert nodules and greenish-gray to grayish-red phosphatic shale with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale on the basis of fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City Fault (Osborne and Szabo, 1984). The Ordovician sequence comprising the Eden thrust sheet is exposed at FTMC through an eroded "window" or "fenster" in the overlying thrust sheet. Rocks within the window display complex folding with the folds being overturned, and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation, north by the Conasauga Formation, northeast, east, and southwest by the Shady Dolomite, and southeast and southwest by the Chilhowee Group (Osborne et al., 1997).

4.1.2 Site Geology

The soil type at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) is classified as Montevallo. Montevallo soils are generally characterized by severely eroded, shaley silty clay soils developed from interbedded shale and fine-grained sandstone. These soils are formed either by erosional forces, surface runoff, or natural reworking processes. The high erosion hazard, low capacity for moisture, and thin root zone make this soil unsuitable for cultivation (U.S. Department of Agriculture, 1961).

The 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7), is situated on the western boundary of the Ordovician window. Bedrock beneath the majority of the site is mapped as Ordovician-Mississippian Athens and Floyd Shales, undifferentiated. The contact of the Athens and Floyd Shales, undifferentiated and the Little Oak and Newala Limestones, undifferentiated is mapped along the southern perimeter of the parcel, roughly paralleling 20th Street (Osborne et al., 1997). Figure 4-1 is a site geologic map showing the bedrock units in the vicinity of the site.

Two geologic cross sections (A-A' and B-B') were constructed with boring log data from the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) and are presented on Figures 4-2 and 4-3. The geologic cross section locations are shown on Figure 3-1.

Cross section A-A' (Figure 4-2) depicts the subsurface units along a line trending southwest to northeast between borings FTA-29-GP08 and FTA-29-GP09. Residium consisting primarily of clay and silt (with some gravel) was encountered along the cross section A-A'. Weathered shale was encountered below the clay unit in the two deeper wells depicted in cross section A-A'.

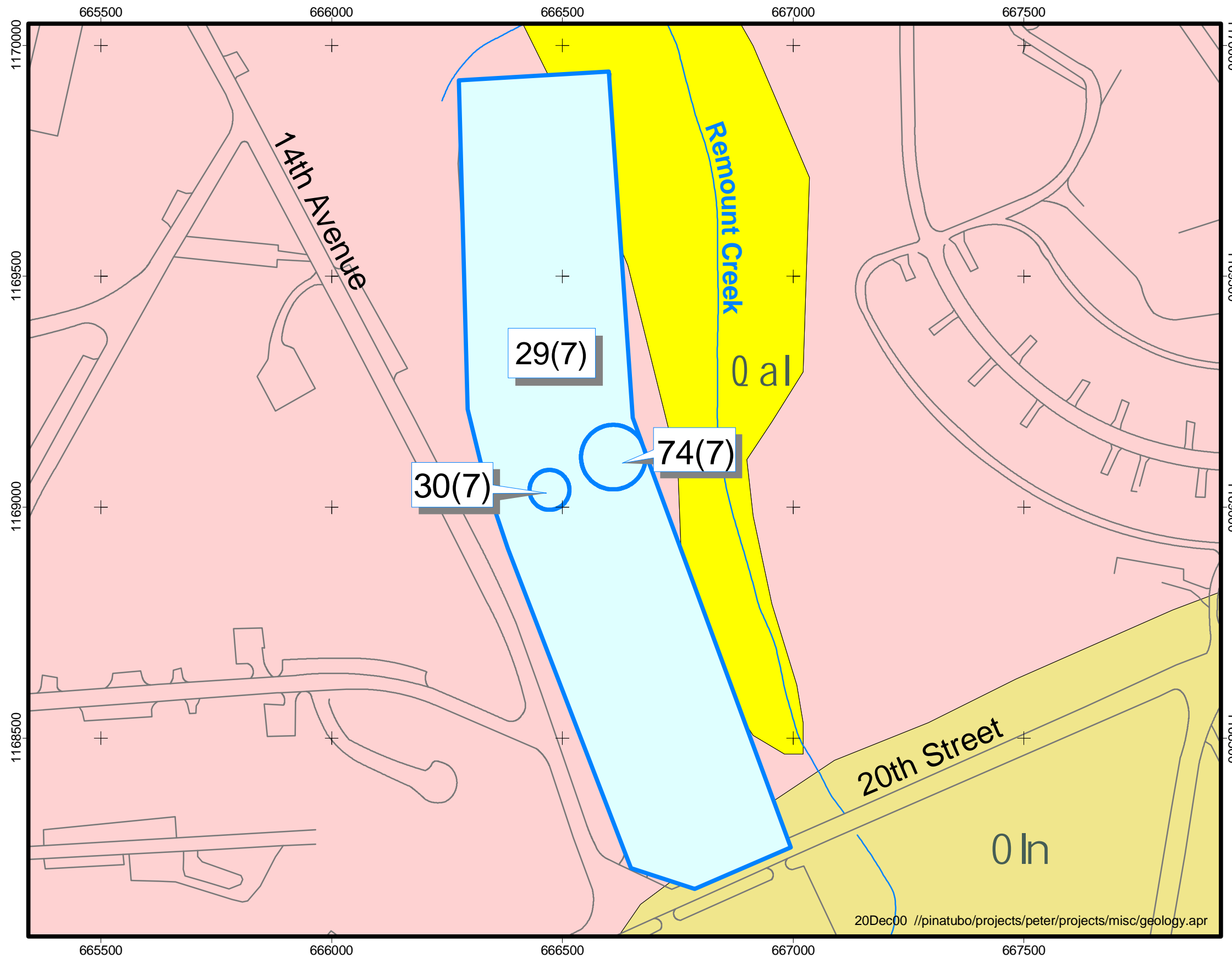


Figure 4-1

Site Geologic Map
11th Chemical Motor Pool Area
Parcels 29(7), 30(7), and 74(7)

Legend

CERFA Parcels 29(7), 30(7) and 74(7)

Streams

Roads

Geology

MOfa Mississippiian/Ordovician - Floyd & Athens Shale, Undifferentiated

0ln Ordovician - Little Oak and Newala Limestones

Qal Quaternary - alluvium

0 200 400
State Plane feet, NAD83



December 2000

U.S. Army Corps of Engineers
Mobile District
Fort McClellan
Calhoun County, Alabama
Contract No. DACA21-96-D-0018



Cross section B-B' (Figure 4-3) depicts the subsurface units along a line trending southwest to northeast between borings FTA-29-GP06 and FTA-29-GP05. Residuum consisting primarily of clay was encountered along the entire length of cross section B-B'. A gravel lens was encountered along the cross section at a depth of 6 to 10 feet bgs. Weathered shale was encountered below the clay unit along the entire length of cross section B-B'.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates. The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

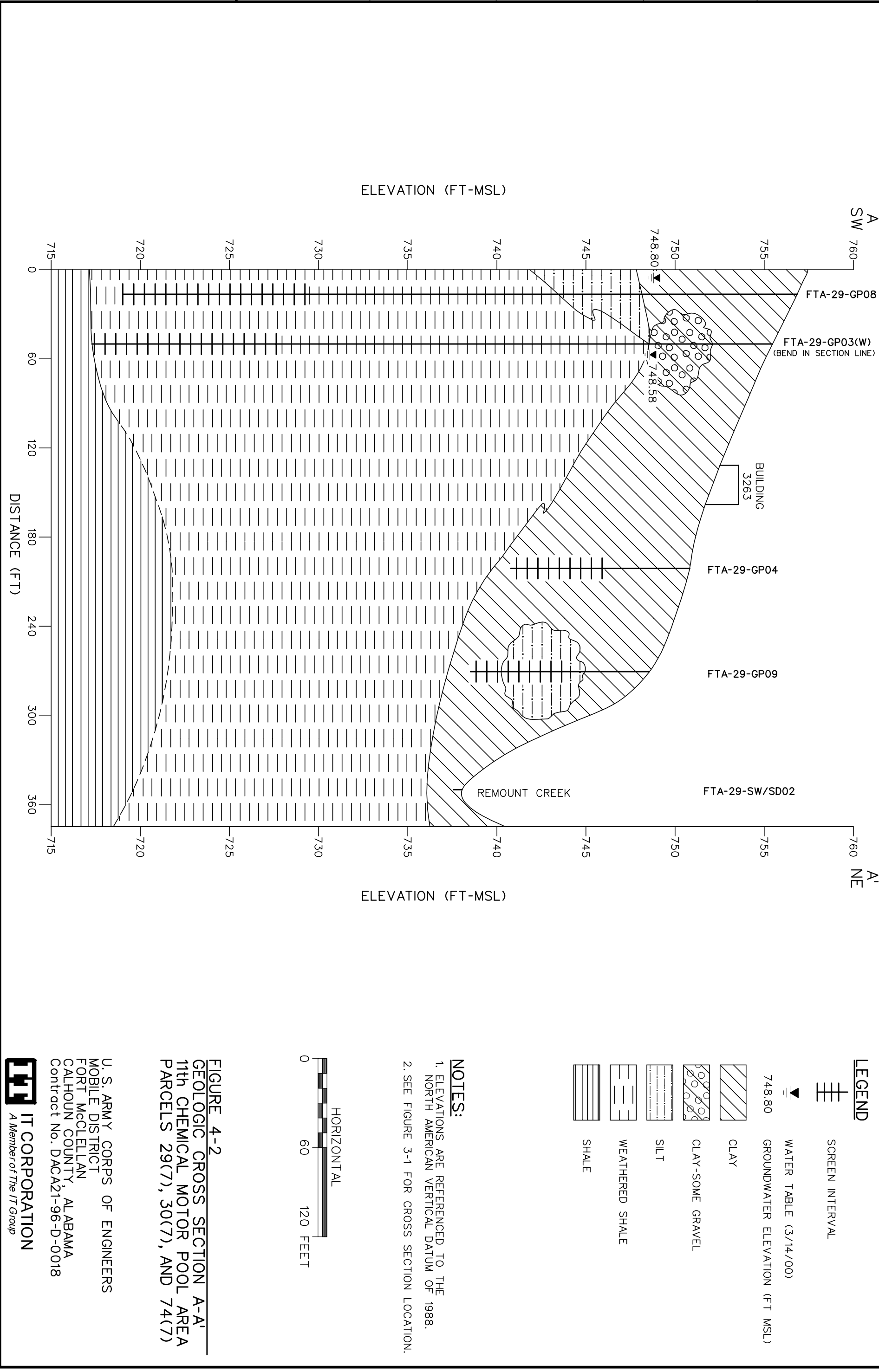
Remount Creek flows northward along the eastern boundary of the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The land surface of the site slopes to the east toward Remount Creek. Surface runoff in the vicinity of the site is directed to Remount Creek by surface grading and storm drains.

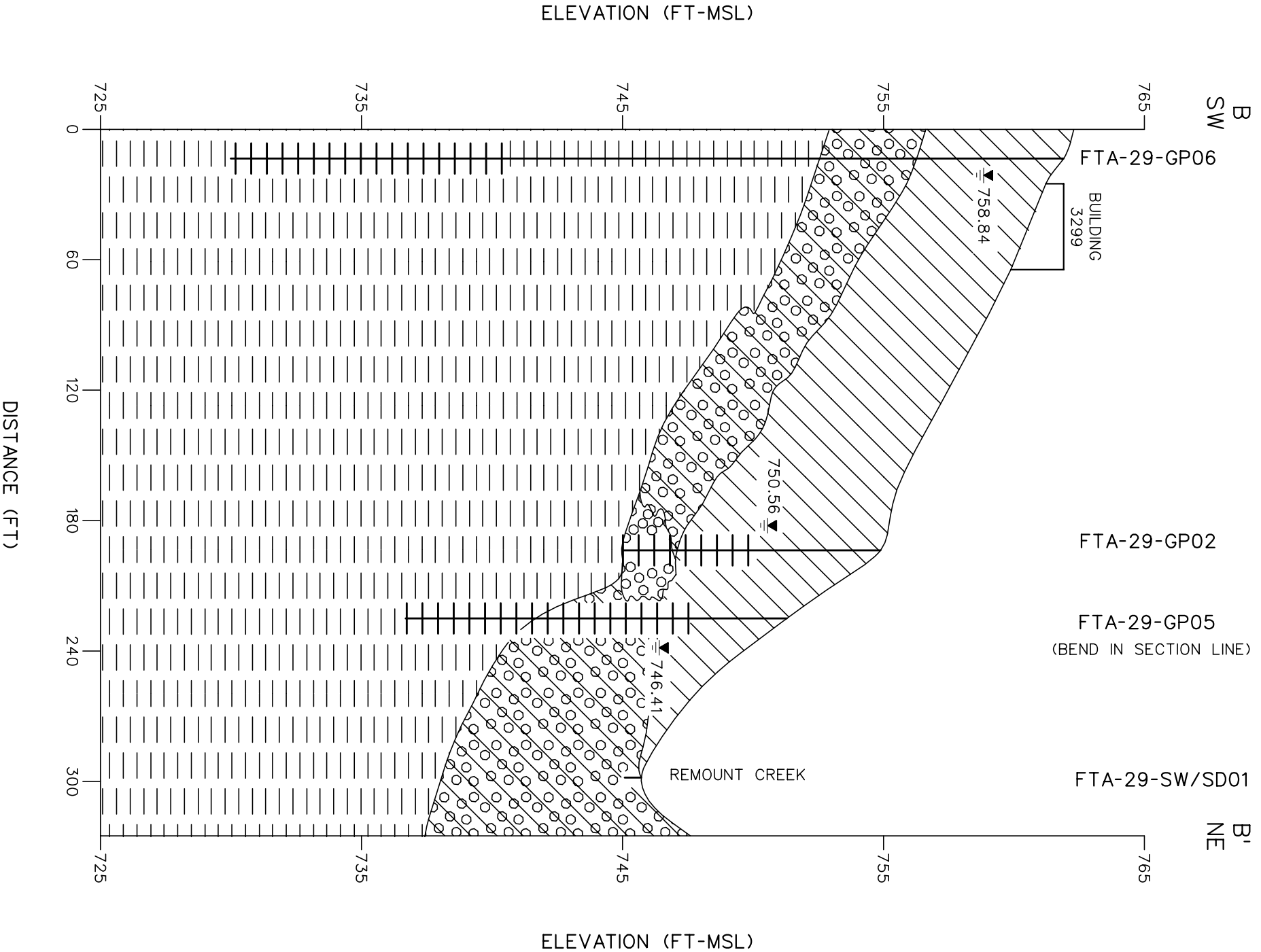
4.2.2 Hydrogeology

During boring and well installation activities, groundwater was generally encountered in residuum near Remount Creek at depths of 5.5 to 10 feet bgs. Based on drill cuttings from temporary well locations on the western perimeter of the parcel, groundwater was encountered in the weathered shale at depths ranging from about 24 to 30 feet bgs.

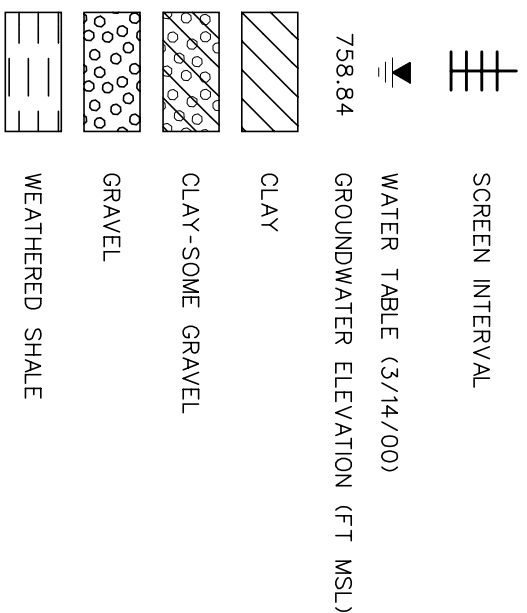
Static groundwater levels were measured in temporary and existing monitoring wells on March 14, 2000. Table 3-4 summarizes static groundwater elevations at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). A groundwater elevation map was constructed from the March 2000 data, as shown on Figure 4-4. The groundwater elevation map shows that groundwater flow is to the east-northeast and discharges to Remount Creek. The hydraulic gradient across the site is approximately 0.06 feet per foot.

Static groundwater levels in temporary wells completed in residuum on the eastern perimeter of the parcel are about 3.5 to 7 feet above the depth that water was observed in the associated boring





LEGEND



NOTES:

1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
2. SEE FIGURE 3-1 FOR CROSS SECTION LOCATION.

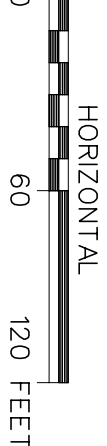


FIGURE 4-3
GEOLOGIC CROSS SECTION B-B'
11th CHEMICAL MOTOR POOL AREA
PARCELS 29(7), 30(7), AND 74(7)

during SI drilling activities. In addition, static groundwater levels in temporary wells completed in weathered shale along the western perimeter of the parcel are about 20 to 22 feet above the depth that water was observed from drill cuttings during SI drilling activities. This suggests that groundwater has an upward hydraulic head in both residuum and weathered shale.

5.0 Summary of Analytical Results

The results of the chemical analyses of samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) indicate that metals, VOCs, and SVOCs have been detected in the various site media. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, detected constituent concentrations were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC.

Metal concentrations exceeding the SSSLs and ESVs were subsequently compared to metals background screening values (background concentrations) (SAIC, 1998) to determine if the metals concentrations are within natural background concentrations. Summary statistics for background metals samples collected at FTMC (SAIC, 1998) are included in Appendix H. Additionally, SVOC concentrations in surface and depositional soils that exceeded the SSSLs and ESVs were compared to PAH background screening values, where available. The PAH background screening values were derived from PAH analytical data from 18 parcels at FTMC that were determined to represent anthropogenic activity (IT, 2000b). PAH background screening values were developed for 2 categories of surface soils: beneath asphalt and adjacent to asphalt. The PAH background screening values for soils adjacent to asphalt are the more conservative (i.e., lower) of the PAH background values and are the values used herein for comparison.

Six compounds were quantified by both SW-846 Method 8260B (as VOC) and Method 8270C (as SVOC), including 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, and naphthalene. Method 8260B yields a reporting limit (RL) of 0.005 mg/kg, while Method 8270C has a RL of 0.330 mg/kg, which is typical for a soil matrix sample. Because of the direct nature of the Method 8260B analysis and its resulting lower RL, this method should be considered superior to Method 8270C when quantifying low levels (0.005 to 0.330 mg/kg) of these compounds. Method 8270C and its associated methylene chloride extraction step is superior, however when dealing with samples that contain higher concentrations (greater than 0.330 mg/kg) of these compounds. Therefore all data were considered and none were categorically excluded. Data validation qualifiers were helpful in evaluating the usability of data, especially if calibration, blank contamination, precision, or accuracy indicator anomalies were encountered. The validation qualifiers and concentrations

reported (e.g., whether concentrations were less than or greater than 0.330 mg/kg) were used to determine which analytical method was likely to return the more accurate result.

The following sections and Tables 5-1 through 5-5 summarize the results of the comparison of detected constituents to the SSSLs, ESVs, and background screening values. Complete analytical results are presented in Appendix E.

5.1 Surface and Depositional Soil Analytical Results

Four surface soil samples and two depositional soil samples were collected for chemical analyses at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Surface and depositional soil samples were collected from the upper 1 foot of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and background screening values (metals and PAHs), as presented in Table 5-1.

Metals. Eighteen metals were detected in surface and depositional soil samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The selenium results were flagged with a “B” data qualifier, indicating that the selenium was also detected in an associated laboratory or field blank. Sample location FTA-29-DEP01 contained each of the detected metals except cadmium.

Five metals (aluminum, arsenic, chromium, iron, and manganese) were detected at concentrations exceeding residential human health SSSLs. With the exception of iron (two locations), the concentrations of these metals were within background concentrations. The iron results were within the range of background values (Appendix H).

The following 11 metals were detected at concentrations exceeding ESVs: aluminum, arsenic, beryllium, cadmium, chromium, iron, lead, manganese, selenium, vanadium, and zinc. Of these metals, the concentrations of beryllium (1 location), cadmium (2 locations), iron (2 locations), lead (1 location), selenium (2 locations), and zinc (4 locations) also exceeded background concentrations. With the exception of the beryllium and cadmium results, these metals concentrations were within the range of background values (Appendix H).

Table 5-1

Surface and Depositional Soil Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

(Page 1 of 4)

Sample Location Sample Number Sample Date Sample Depth (Feet)					FTA-29-DEP01 AA1004 6-Nov-98 0- 1					FTA-29-DEP02 AA1005 6-Nov-98 0- 1					FTA-29-GP01 AA0001 1-Oct-98 0- 1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.09E+04			YES	YES	5.98E+03				YES	5.82E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.11E+01			YES	YES	5.60E+00			YES		6.70E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.91E+01					4.88E+01					6.64E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	1.60E+00		YES		YES	ND					ND				
Cadmium	mg/kg	2.90E-01	6.25E+00	1.60E+00	ND					2.10E+00		YES		YES	2.90E+00		YES		YES
Calcium	mg/kg	1.72E+03	NA	NA	1.38E+03					4.43E+04		YES			2.56E+04		YES		
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.37E+01			YES	YES	1.59E+01				YES	2.29E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	6.90E+00					5.90E+00					8.50E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.06E+01		YES			1.97E+01		YES			1.97E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	5.59E+04		YES	YES	YES	1.48E+04			YES	YES	1.87E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.34E+01	J				3.62E+01	J				7.51E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	7.04E+02					2.60E+04		YES			1.20E+04		YES		
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	6.71E+02			YES	YES	3.78E+02			YES	YES	3.99E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	8.20E-02		YES			5.50E-02					3.90E-02				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.48E+01		YES			9.10E+00					9.70E+00				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	8.40E-01	B	YES		YES	ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.56E+01				YES	1.98E+01				YES	1.55E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	6.05E+01		YES		YES	1.13E+02		YES		YES	1.17E+02		YES		YES
VOLATILE ORGANIC COMPOUNDS																			
1,1,1,2-Tetrachloroethane	mg/kg	NA	2.41E+01	1.00E-01	ND					2.00E-03	J				ND				
1,1,2,2-Tetrachloroethane	mg/kg	NA	3.13E+00	1.00E-01	ND					4.60E-03	J				ND				
1,1,2-Trichloroethane	mg/kg	NA	1.11E+01	1.00E-01	ND					1.90E-03	J				ND				
1,2,3-Trichloropropane	mg/kg	NA	8.97E-02	1.00E-01	ND					6.90E-03	J				ND				
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	1.00E-01	ND					9.70E-03	J				ND				
1,2-Dibromo-3-Chloropropane	mg/kg	NA	4.50E-01	1.00E-01	ND					8.50E-03	J				ND				
1,2-Dichlorobenzene	mg/kg	NA	6.99E+02	1.00E-02	ND					3.70E-03	J				ND				
1,2-Dichloropropane	mg/kg	NA	9.26E+00	7.00E+02	ND					1.30E-03	J				ND				
1,2-Dimethylbenzene	mg/kg	NA	1.55E+04	5.00E-02	ND					2.70E-03	J				ND				
1,3,5-Trimethylbenzene	mg/kg	NA	3.88E+02	1.00E-01	ND					6.90E-03	J				ND				
1,3-Dichlorobenzene	mg/kg	NA	6.99E+00	1.00E-02	ND					2.80E-03	J				ND				
1,3-Dichloropropane	mg/kg	NA	NA	7.00E+02	ND					1.80E-03	J				ND				
1,4-Dichlorobenzene	mg/kg	NA	2.62E+01	1.00E-02	ND					3.30E-03	J				ND				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					4.10E-02	J				ND				
2-Hexanone	mg/kg	NA	3.11E+02	1.26E+01	ND					1.20E-02	J				ND				
4-Methyl-2-pentanone	mg/kg	NA	6.21E+02	4.43E+02	ND					2.00E-02	J				ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	2.70E-02	B				2.40E-01	J				ND				
Bromobenzene	mg/kg	NA	1.55E+02	1.00E-01	ND					4.20E-03	J				ND				
Carbon disulfide	mg/kg	NA	7.77E+02	9.00E-02	ND					4.40E-03	J				ND				
Chlorobenzene	mg/kg	NA	1.55E+02	5.00E-02	ND					1.90E-03	J				ND				
Ethylbenzene	mg/kg	NA	7.77E+02	5.00E-02	ND					3.10E-03	J				ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	4.90E-03	B				5.20E-03	B				5.50E-03	B			
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					3.70E-03	J				2.00E-03	J			
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND					8.40E-03	J			
m,p-Xylenes	mg/kg	NA	1.55E+04	5.00E-02	ND					6.00E-03	J				ND				
n-Propylbenzene	mg/kg	NA	7.77E+01	NA	ND					4.30E-03	J				ND				
o-Chlorotoluene	mg/kg	NA	1.55E+02	1.00E-01	ND					4.40E-03	J				ND				
p-Chlorotoluene	mg/kg	NA	1.55E+02	1.00E-01	ND					3.80E-03	J				ND				
tert-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					3.60E-03	J				ND				

Table 5-1

Surface and Depositional Soil Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					FTA-29-DEP01 AA1004 6-Nov-98 0- 1					FTA-29-DEP02 AA1005 6-Nov-98 0- 1					FTA-29-GP01 AA0001 1-Oct-98 0- 1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
SEMIVOLATILE ORGANIC COMPOUNDS																			
Acenaphthylene	mg/kg	8.91E-01	4.63E+02	6.82E+02	ND					ND					2.20E-01	J			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND					3.40E-01	J			YES
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	3.70E-02	J				ND					5.20E-01				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	3.50E-02	J				2.60E-02	J				5.20E-01			YES	YES
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	3.60E-02	J				3.70E-02	J				7.00E-01				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					4.00E-02	J				4.40E-01				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND					7.10E-01				
Carbazole	mg/kg	NA	3.11E+01	NA	ND					ND					9.80E-02	J			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	4.00E-02	J				4.70E-02	J				6.30E-01				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND					1.80E-01	J		YES	
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	8.00E-02	J				4.50E-02	J				7.30E-01				YES
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND					3.80E-01	J			
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND					5.70E-02	J			
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	5.80E-02	J				4.30E-02	J				8.20E-01				YES
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND					3.50E-01	J				2.10E-01	J			

Table 5-1

Surface and Depositional Soil Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					FTA-29-GP02 AA0003 1-Oct-98 0- 1					FTA-29-GP03 AA0007 30-Sep-98 0- 1					FTA-29-GP04 AA0009 30-Sep-98 0- 1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	7.00E+03				YES	1.14E+04			YES	YES	6.08E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.20E+00			YES		4.90E+00			YES		5.40E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	ND					9.02E+01					4.52E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					8.30E-01		YES			6.80E-01				
Cadmium	mg/kg	2.90E-01	6.25E+00	1.60E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	ND					4.87E+03	J	YES			5.74E+03	J	YES		
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.74E+01				YES	2.35E+01	J		YES	YES	1.87E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					1.58E+01		YES			9.90E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	8.00E+00					2.46E+01		YES			1.39E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.74E+04			YES	YES	3.42E+04		YES	YES	YES	2.17E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.45E+01					2.13E+01					1.66E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	ND					5.55E+03	J	YES			3.47E+03	J	YES		
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.69E+02				YES	4.26E+02			YES	YES	4.47E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	5.20E-02					ND					ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	ND					2.47E+01		YES			1.06E+01		YES		
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					6.80E-01	B	YES			8.70E-01	B	YES		YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.01E+01				YES	6.90E+00				YES	1.06E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.45E+01	J				6.85E+01		YES		YES	3.94E+01				
VOLATILE ORGANIC COMPOUNDS																			
1,1,1,2-Tetrachloroethane	mg/kg	NA	2.41E+01	1.00E-01	ND					ND					ND				
1,1,2,2-Tetrachloroethane	mg/kg	NA	3.13E+00	1.00E-01	ND					ND					ND				
1,1,2-Trichloroethane	mg/kg	NA	1.11E+01	1.00E-01	ND					ND					ND				
1,2,3-Trichloropropane	mg/kg	NA	8.97E-02	1.00E-01	ND					ND					ND				
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	1.00E-01	ND					ND					ND				
1,2-Dibromo-3-Chloropropane	mg/kg	NA	4.50E-01	1.00E-01	ND					ND					ND				
1,2-Dichlorobenzene	mg/kg	NA	6.99E+02	1.00E-02	ND					ND					ND				
1,2-Dichloropropane	mg/kg	NA	9.26E+00	7.00E+02	ND					ND					ND				
1,2-Dimethylbenzene	mg/kg	NA	1.55E+04	5.00E-02	ND					ND					ND				
1,3,5-Trimethylbenzene	mg/kg	NA	3.88E+02	1.00E-01	ND					ND					ND				
1,3-Dichlorobenzene	mg/kg	NA	6.99E+00	1.00E-02	ND					ND					ND				
1,3-Dichloropropane	mg/kg	NA	NA	7.00E+02	ND					ND					ND				
1,4-Dichlorobenzene	mg/kg	NA	2.62E+01	1.00E-02	ND					ND					ND				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	3.40E-03	B				ND					6.00E-03	B			
2-Hexanone	mg/kg	NA	3.11E+02	1.26E+01	ND					ND					ND				
4-Methyl-2-pentanone	mg/kg	NA	6.21E+02	4.43E+02	ND					ND					ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	6.50E-02	B				ND					6.80E-02	B			
Bromobenzene	mg/kg	NA	1.55E+02	1.00E-01	ND					ND					ND				
Carbon disulfide	mg/kg	NA	7.77E+02	9.00E-02	ND					ND					ND				
Chlorobenzene	mg/kg	NA	1.55E+02	5.00E-02	ND					ND					ND				
Ethylbenzene	mg/kg	NA	7.77E+02	5.00E-02	ND					ND					ND				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	3.70E-03	B				4.80E-03	B				4.60E-03	B			
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND					ND				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					ND					ND				
m,p-Xylenes	mg/kg	NA	1.55E+04	5.00E-02	ND					ND					ND				
n-Propylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND				
o-Chlorotoluene	mg/kg	NA	1.55E+02	1.00E-01	ND					ND					ND				
p-Chlorotoluene	mg/kg	NA	1.55E+02	1.00E-01	ND					ND					ND				
tert-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND				

Table 5-1

Surface and Depositional Soil Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)					FTA-29-GP02 AA0003 1-Oct-98 0- 1					FTA-29-GP03 AA0007 30-Sep-98 0- 1					FTA-29-GP04 AA0009 30-Sep-98 0- 1				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
SEMIVOLATILE ORGANIC COMPOUNDS																			
Acenaphthylene	mg/kg	8.91E-01	4.63E+02	6.82E+02	ND					ND					ND				
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND					ND				
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND					ND				
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					4.20E-02	J				ND				
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					4.40E-02	J				ND				
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					4.80E-02	J				ND				
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND					ND				
Carbazole	mg/kg	NA	3.11E+01	NA	ND					ND					ND				
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND					ND				
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND					ND				
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	ND					ND					ND				
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND					ND				
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND					ND				
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	ND					ND					ND				
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND					ND					7.90E-02	J			

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama, July*. For SVOCs, value listed is the background screening criterion for soils adjacent to asphalt as given in IT Corporation (2000b), *Final and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July*.

Human Health

^b Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), *Final and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July*.

Human Health

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram

NA - Not available

ND - Not detected

Qual - Data validation qualifier

Table 5-2

Subsurface Soil Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				FTA-29-GP01 AA0002 1-Oct-98 4.5- 9				FTA-29-GP02 AA0006 1-Oct-98 5 - 8				FTA-29-GP03 AA0008 30-Sep-98 1 - 3				FTA-29-GP04 AA0010 30-Sep-98 5 - 10				FTA-29-GP05 AA0011 30-Sep-98 8 - 10			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																							
Aluminum	mg/kg	1.36E+04	7.80E+03	4.47E+03				1.00E+04			YES	5.40E+03				5.76E+03				5.14E+03			
Arsenic	mg/kg	1.83E+01	4.26E-01	9.30E+00			YES	4.90E+00			YES	4.80E+00			YES	4.90E+00			YES	1.36E+01			YES
Barium	mg/kg	2.34E+02	5.47E+02	5.17E+01				8.93E+01				4.79E+01				3.99E+01				5.35E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	7.80E-01				8.40E-01				6.10E-01				ND				1.20E+00		YES	
Cadmium	mg/kg	2.20E-01	6.25E+00	ND				ND				ND				6.00E-01		YES		ND			
Calcium	mg/kg	6.37E+02	NA	ND				4.34E+03		YES		1.02E+04	J	YES		3.59E+04	J	YES		7.57E+02	J	YES	
Chromium	mg/kg	3.83E+01	2.32E+01	2.49E+01			YES	1.92E+01				1.06E+01	J			1.54E+01	J			2.25E+01	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	1.84E+01		YES		1.37E+01				ND				1.23E+01				2.58E+01		YES	
Copper	mg/kg	1.94E+01	3.13E+02	1.14E+01				2.89E+01		YES		1.24E+01				1.62E+01				1.91E+01			
Iron	mg/kg	4.48E+04	2.34E+03	3.13E+04			YES	3.06E+04			YES	1.00E+04			YES	1.94E+04			YES	4.39E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	9.90E+00				1.75E+01				8.40E+00				2.03E+01				2.55E+01			
Magnesium	mg/kg	7.66E+02	NA	6.57E+02				3.85E+03		YES		3.25E+03	J	YES		2.00E+04	J	YES		6.66E+02	J		
Manganese	mg/kg	1.36E+03	3.63E+02	4.47E+02			YES	1.99E+03		YES	YES	8.77E+01				3.79E+02			YES	9.63E+02			YES
Mercury	mg/kg	7.00E-02	2.33E+00	ND				1.30E-01		YES		ND				ND				ND			
Nickel	mg/kg	1.29E+01	1.54E+02	2.23E+01		YES		1.99E+01		YES		1.03E+01				1.07E+01				2.14E+01		YES	
Potassium	mg/kg	7.11E+02	NA	ND				ND				ND				ND				ND			
Selenium	mg/kg	4.70E-01	3.91E+01	ND				8.00E-01	B	YES		ND				ND				8.30E-01	B	YES	
Vanadium	mg/kg	6.49E+01	5.31E+01	ND				8.10E+00				1.15E+01				1.58E+01				6.00E+00	B		
Zinc	mg/kg	3.49E+01	2.34E+03	3.83E+01		YES		3.00E+02		YES		2.92E+01				3.33E+01				5.37E+01		YES	
VOLATILE ORGANIC COMPOUNDS																							
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	ND				3.90E-01				ND				ND				ND			
2-Butanone	mg/kg	NA	4.66E+03	ND				ND				ND				ND				6.30E-03	B		
Acetone	mg/kg	NA	7.76E+02	1.70E-02	B			ND				ND				1.50E-02	B			4.60E-02	B		
Benzene	mg/kg	NA	2.17E+01	ND				ND				ND				ND				ND			
Carbon disulfide	mg/kg	NA	7.77E+02	3.90E-03	J			ND				ND				ND				ND			
Cumene	mg/kg	NA	7.77E+02	ND				4.10E-01				ND				ND				ND			
Ethylbenzene	mg/kg	NA	7.77E+02	ND				1.70E-01	J			ND				ND				ND			
Methylene chloride	mg/kg	NA	8.41E+01	1.70E-03	B			1.60E-01	B			6.90E-03	B			4.70E-03	B			5.50E-03	B		
Naphthalene	mg/kg	NA	1.55E+02	ND				2.20E+00				ND				ND				ND			
n-Butylbenzene	mg/kg	NA	7.77E+01	ND				1.30E+00				ND				ND				ND			
n-Propylbenzene	mg/kg	NA	7.77E+01	ND				6.60E-01				ND				ND				ND			
p-Cymene	mg/kg	NA	1.55E+03	ND				9.90E-01				ND				ND				ND			
sec-Butylbenzene	mg/kg	NA	7.77E+01	ND				1.30E+00				ND				ND				ND			

Table 5-2

Subsurface Soil Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date Sample Depth (Feet)				FTA-29-GP01 AA0002 1-Oct-98 4.5- 9				FTA-29-GP02 AA0006 1-Oct-98 5 - 8				FTA-29-GP03 AA0008 30-Sep-98 1 - 3				FTA-29-GP04 AA0010 30-Sep-98 5 - 10				FTA-29-GP05 AA0011 30-Sep-98 8 - 10			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
SEMIVOLATILE ORGANIC COMPOUNDS																							
2-Methylnaphthalene	mg/kg	NA	1.55E+02	ND				1.40E+01				ND				ND				ND			
Anthracene	mg/kg	NA	2.33E+03	ND				7.20E-01				ND				ND				ND			
Benzo(a)anthracene	mg/kg	NA	8.51E-01	ND				4.40E-01				ND				ND				ND			
Benzo(a)pyrene	mg/kg	NA	8.51E-02	ND				3.10E-01	J		YES	ND				ND				ND			
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01	ND				3.30E-01	J			ND				ND				ND			
Benzo(ghi)perylene	mg/kg	NA	2.32E+02	ND				1.50E-01	J			ND				ND				ND			
Benzo(k)fluoranthene	mg/kg	NA	8.51E+00	ND				2.80E-01	J			ND				ND				ND			
Carbazole	mg/kg	NA	3.11E+01	ND				3.60E-01	J			ND				ND				ND			
Chrysene	mg/kg	NA	8.61E+01	ND				3.50E-01	J			ND				ND				ND			
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02	ND				7.00E-02	J			ND				ND				ND			
Fluoranthene	mg/kg	NA	3.09E+02	ND				1.00E+00				ND				ND				ND			
Fluorene	mg/kg	NA	3.09E+02	ND				2.80E+00				ND				ND				ND			
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01	ND				1.70E-01	J			ND				ND				ND			
Naphthalene	mg/kg	NA	1.55E+02	ND				2.70E+00				ND				ND				ND			
Phenanthrene	mg/kg	NA	2.32E+03	ND				5.70E+00				ND				ND				ND			
Pyrene	mg/kg	NA	2.33E+02	ND				2.00E+00				ND				ND				ND			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	ND				6.90E-02	J			ND				ND				ND			

Table 5-2

Subsurface Soil Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

(Page 3 of 4)

Sample Location Sample Number Sample Date Sample Depth (Feet)				FTA-29-GP06 AA0012 30-Sep-98 4 - 8				FTA-29-GP07 AA0013 30-Sep-98 8 - 10				FTA-29-GP08 AA0014 30-Sep-98 8 - 10				FTA-29-GP09 AA0015 1-Oct-98 4 - 8				FTA-29-GP10 AA0016 1-Oct-98 4 - 5			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																							
Aluminum	mg/kg	1.36E+04	7.80E+03	8.49E+03			YES	1.53E+04		YES	YES	1.44E+04		YES	YES	3.54E+03				5.43E+03			
Arsenic	mg/kg	1.83E+01	4.26E-01	2.90E+00			YES	6.60E+00			YES	6.80E+00			YES	ND				5.90E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	4.03E+01				9.05E+01				1.01E+02				5.03E+01				2.97E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				1.30E+00		YES		1.50E+00		YES		ND				ND			
Cadmium	mg/kg	2.20E-01	6.25E+00	ND				5.50E-01		YES		8.20E-01		YES		ND				5.40E-01		YES	
Calcium	mg/kg	6.37E+02	NA	ND				1.81E+03	J	YES		8.49E+02	J	YES		ND				ND			
Chromium	mg/kg	3.83E+01	2.32E+01	1.25E+01	J			2.42E+01	J		YES	2.42E+01	J		YES	7.60E+00		YES		2.00E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	ND				1.72E+01				2.74E+01		YES		ND				9.50E+00			
Copper	mg/kg	1.94E+01	3.13E+02	8.30E+00				4.72E+01		YES		4.99E+01		YES		4.10E+00				1.62E+01			
Iron	mg/kg	4.48E+04	2.34E+03	1.57E+04			YES	3.81E+04			YES	4.13E+04			YES	6.89E+03		YES		2.33E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.06E+01				1.97E+01				2.16E+01				7.70E+00				9.70E+00			
Magnesium	mg/kg	7.66E+02	NA	5.98E+02	J			7.67E+03	J	YES		7.18E+03	J	YES		ND				8.89E+02		YES	
Manganese	mg/kg	1.36E+03	3.63E+02	5.55E+01				2.57E+02				3.91E+02			YES	1.46E+02				1.47E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	ND				ND				ND				ND				5.20E-02			
Nickel	mg/kg	1.29E+01	1.54E+02	ND				3.27E+01		YES		5.22E+01		YES		ND				8.90E+00			
Potassium	mg/kg	7.11E+02	NA	ND				5.93E+02				ND				ND				ND			
Selenium	mg/kg	4.70E-01	3.91E+01	ND				1.10E+00	B	YES		1.00E+00	B	YES		ND				6.80E-01	B	YES	
Vanadium	mg/kg	6.49E+01	5.31E+01	1.14E+01				ND				ND				7.40E+00				9.30E+00			
Zinc	mg/kg	3.49E+01	2.34E+03	1.34E+01				1.02E+02		YES		1.22E+02		YES		7.90E+00				3.73E+01		YES	
VOLATILE ORGANIC COMPOUNDS																							
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	ND				ND				ND				ND				ND			
2-Butanone	mg/kg	NA	4.66E+03	ND				ND				ND				ND				ND			
Acetone	mg/kg	NA	7.76E+02	2.30E-02	B			1.30E-02	B			2.50E-02	B			1.90E-02	B			6.90E-02	B		
Benzene	mg/kg	NA	2.17E+01	ND				ND				4.90E-03	J			ND				ND			
Carbon disulfide	mg/kg	NA	7.77E+02	ND				ND				ND				ND				ND			
Cumene	mg/kg	NA	7.77E+02	ND				ND				ND				ND				ND			
Ethylbenzene	mg/kg	NA	7.77E+02	ND				ND				ND				ND				ND			
Methylene chloride	mg/kg	NA	8.41E+01	5.40E-03	B			4.40E-03	B			3.70E-03	B			1.50E-03	B			4.20E-03	B		
Naphthalene	mg/kg	NA	1.55E+02	ND				ND				ND				ND				ND			
n-Butylbenzene	mg/kg	NA	7.77E+01	ND				ND				ND				ND				ND			
n-Propylbenzene	mg/kg	NA	7.77E+01	ND				ND				ND				ND				ND			
p-Cymene	mg/kg	NA	1.55E+03	ND				ND				ND				ND				ND			
sec-Butylbenzene	mg/kg	NA	7.77E+01	ND				ND				ND				ND				ND			

Table 5-2

Subsurface Soil Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

(Page 4 of 4)

Sample Location Sample Number Sample Date Sample Depth (Feet)				FTA-29-GP06 AA0012 30-Sep-98 4 - 8				FTA-29-GP07 AA0013 30-Sep-98 8 - 10				FTA-29-GP08 AA0014 30-Sep-98 8 - 10				FTA-29-GP09 AA0015 1-Oct-98 4 - 8				FTA-29-GP10 AA0016 1-Oct-98 4 - 5			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
SEMIVOLATILE ORGANIC COMPOUNDS																							
2-Methylnaphthalene	mg/kg	NA	1.55E+02	ND				ND				ND				ND				ND			
Anthracene	mg/kg	NA	2.33E+03	ND				ND				ND				ND				ND			
Benzo(a)anthracene	mg/kg	NA	8.51E-01	ND				ND				ND				ND				ND			
Benzo(a)pyrene	mg/kg	NA	8.51E-02	ND				ND				ND				ND				ND			
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01	ND				ND				ND				ND				ND			
Benzo(ghi)perylene	mg/kg	NA	2.32E+02	ND				ND				ND				ND				ND			
Benzo(k)fluoranthene	mg/kg	NA	8.51E+00	ND				ND				ND				ND				ND			
Carbazole	mg/kg	NA	3.11E+01	ND				ND				ND				ND				ND			
Chrysene	mg/kg	NA	8.61E+01	ND				ND				ND				ND				ND			
Dibenz(a,h)anthracene	mg/kg	NA	8.61E-02	ND				ND				ND				ND				ND			
Fluoranthene	mg/kg	NA	3.09E+02	ND				ND				ND				ND				ND			
Fluorene	mg/kg	NA	3.09E+02	ND				ND				ND				ND				ND			
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01	ND				ND				ND				ND				ND			
Naphthalene	mg/kg	NA	1.55E+02	ND				ND				ND				ND				ND			
Phenanthrene	mg/kg	NA	2.32E+03	ND				ND				ND				ND				ND			
Pyrene	mg/kg	NA	2.33E+02	ND				ND				ND				ND				ND			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	ND				ND				ND				ND				ND			

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

^b Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000b), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram

NA - Not available

ND - Not detected

Qual - Data validation qualifier

Table 5-3

Groundwater Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

(Page 1 of 6)

Sample Location Sample Number Sample Date				FTA-29-GP01 AA3001 21-Oct-98				FTA-29-GP02 AA3002 16-Dec-98				FTA-29-GP03 AA3003 14-Dec-98				FTA-29-GP04 AA3004 21-Oct-98				FTA-29-GP05 AA3005 15-Dec-98			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																							
Aluminum	mg/L	2.34E+00	1.56E+00	2.33E+02		YES	YES	4.53E-01				ND				6.37E+00	YES	YES		1.83E+01		YES	YES
Arsenic	mg/L	1.78E-02	4.00E-05	1.22E-01		YES	YES	1.22E-02			YES	ND				ND				9.10E-03	J		YES
Barium	mg/L	1.27E-01	1.10E-01	1.76E+00		YES	YES	1.42E-01	J	YES	YES	1.68E-01	J	YES	YES	ND				7.73E-01		YES	YES
Beryllium	mg/L	1.24E-03	3.12E-03	1.36E-02		YES	YES	ND				ND				ND				ND			
Cadmium	mg/L	2.51E-03	7.80E-04	1.08E-02		YES	YES	ND				ND				ND				ND			
Calcium	mg/L	5.65E+01	NA	8.62E+01		YES		7.15E+01		YES		8.35E+01		YES		1.30E+02		YES		6.71E+01		YES	
Chromium	mg/L	NA	4.69E-03	4.42E-01			YES	ND				ND				1.06E-02		YES		3.37E-02			YES
Cobalt	mg/L	2.34E-02	9.39E-02	2.69E-01		YES	YES	ND				ND				ND				1.03E-02	J		
Copper	mg/L	2.55E-02	6.26E-02	3.83E-01		YES	YES	ND				ND				ND				2.26E-02	J		
Iron	mg/L	7.04E+00	4.69E-01	3.30E+02		YES	YES	5.26E+00		YES		4.21E-01		YES	YES	1.85E+01		YES	YES	4.00E+01		YES	YES
Lead	mg/L	7.99E-03	1.50E-02	5.26E-01		YES	YES	ND				ND				1.03E-02		YES		1.50E-02		YES	YES
Magnesium	mg/L	2.13E+01	NA	5.07E+01		YES		1.32E+01				2.55E+01		YES		4.34E+01		YES		2.78E+01		YES	
Manganese	mg/L	5.81E-01	7.35E-02	6.27E+00		YES	YES	3.06E-01		YES		9.35E-02		YES	YES	3.78E+00		YES	YES	4.35E+00		YES	YES
Mercury	mg/L	NA	4.60E-04	2.90E-04	B			6.40E-05	B			5.50E-05	B			ND				1.00E-04	B		
Nickel	mg/L	NA	3.13E-02	3.75E-01			YES	ND				ND				ND				2.98E-02	J		
Potassium	mg/L	7.20E+00	NA	2.06E+01		YES		1.53E+01		YES		2.56E+00	J			ND				5.02E+00			
Selenium	mg/L	NA	7.82E-03	1.46E-02			YES	ND				ND				ND				ND			
Sodium	mg/L	1.48E+01	NA	1.04E+01				2.42E+00	J			1.31E+01				ND				6.70E+00			
Thallium	mg/L	1.45E-03	1.00E-04	ND				5.40E-03	B	YES	YES	6.00E-03	B	YES	YES	ND				5.10E-03	B	YES	YES
Vanadium	mg/L	1.70E-02	1.10E-02	3.14E-01		YES	YES	ND				2.17E-02	J	YES	YES	ND				2.72E-02	J	YES	YES
Zinc	mg/L	2.20E-01	4.69E-01	1.03E+00		YES	YES	ND				ND				2.34E-02	B			5.73E-02			
VOLATILE ORGANIC COMPOUNDS																							
1,2,3-Trichlorobenzene	mg/L	NA	1.32E-03	ND				ND				ND				ND				ND			
1,2,4-Trichlorobenzene	mg/L	NA	1.35E-02	ND				ND				ND				ND				ND			
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				5.80E-04	J			ND				ND				ND			
1,2-Dichloropropane	mg/L	NA	9.80E-04	ND				ND				ND				ND				1.50E-04	J		
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				5.30E-04	J			ND				ND				ND			
1,4-Dichlorobenzene	mg/L	NA	1.75E-03	ND				ND				ND				ND				ND			
2-Butanone	mg/L	NA	7.14E-01	ND				ND				ND				2.00E-03	J			ND			
Acetone	mg/L	NA	1.56E-01	1.40E-03	B			1.80E-02	J			ND				2.60E-03	B			ND			
Benzene	mg/L	NA	1.40E-03	ND				9.00E-04	J			ND				ND				ND			
Bromomethane	mg/L	NA	2.17E-03	ND				ND				ND				ND				ND			
Carbon disulfide	mg/L	NA	1.51E-01	6.00E-04	J			ND				ND				2.40E-04	J			ND			
Chlorobenzene	mg/L	NA	1.62E-02	ND				ND				ND				ND				ND			
Cumene	mg/L	NA	1.27E-01	ND				7.60E-03				ND				ND				3.90E-04	J		
Ethylbenzene	mg/L	NA	1.40E-01	ND				6.80E-04	J			ND				ND				ND			
Hexachlorobutadiene	mg/L	NA	8.30E-04	ND				ND				ND				ND				ND			
Naphthalene	mg/L	NA	3.00E-03	ND				7.80E-02	J		YES	ND				ND				ND			
Toluene	mg/L	NA	2.59E-01	ND				ND				ND				ND				ND			
Trichloroethene	mg/L	NA	4.50E-03	ND				ND				ND				ND				ND			
cis-1,2-Dichloroethene	mg/L	NA	1.55E-02	ND				ND				ND				ND				ND			
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND			
n-Butylbenzene	mg/L	NA	9.57E-03	ND				5.60E-03				ND				ND				ND			
n-Propylbenzene	mg/L	NA	1.30E-02	ND				1.10E-02				ND				ND				1.90E-04	J		
o-Chlorotoluene	mg/L	NA	2.82E-02	ND				ND				ND				ND				ND			
p-Chlorotoluene	mg/L	NA	2.82E-02	ND				ND				ND				ND				ND			
p-Cymene	mg/L	NA	2.26E-01	ND				6.40E-04	J			ND				ND				ND			
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				6.30E-03				ND				ND				6.20E-04	J		
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND				ND				6.40E-04	J		

Table 5-3

Groundwater Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date				FTA-29-GP01 AA3001 21-Oct-98				FTA-29-GP02 AA3002 16-Dec-98				FTA-29-GP03 AA3003 14-Dec-98				FTA-29-GP04 AA3004 21-Oct-98				FTA-29-GP05 AA3005 15-Dec-98			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
SEMIVOLATILE ORGANIC COMPOUNDS																							
1,4-Dichlorobenzene	mg/L	NA	1.75E-03	ND				ND				ND				ND				ND			
2-Methylnaphthalene	mg/L	NA	2.48E-02	ND				9.20E-02			YES	ND				ND				ND			
Acenaphthene	mg/L	NA	6.58E-02	ND				8.10E-03	J			ND				ND				ND			
Di-n-butyl phthalate	mg/L	NA	1.48E-01	ND				ND				1.50E-03	J			ND				2.40E-03	J		
Dibenzofuran	mg/L	NA	4.34E-03	ND				2.90E-03	J			ND				ND				ND			
Fluorene	mg/L	NA	4.66E-02	ND				8.60E-03	J			ND				ND				ND			
Naphthalene	mg/L	NA	3.00E-03	ND				4.90E-02			YES	ND				ND				ND			
Phenanthrene	mg/L	NA	2.81E-01	ND				9.60E-03	J			ND				ND				ND			
Phenol	mg/L	NA	9.31E-01	2.80E-03	B			ND				ND				4.20E-03	B			ND			
bis(2-Ethylhexyl)phthalate	mg/L	NA	4.30E-03	ND				ND				ND				ND				ND			

Table 5-3

Groundwater Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date				FTA-29-GP06 AA3006 4-Dec-98				FTA-29-GP07 AA3020 8-Dec-98				FTA-29-GP08 AA3008 14-Dec-98				FTA-29-GP09 AA3009 8-Oct-98				FTA-29-GP10 AA3012 14-Dec-98			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																							
Aluminum	mg/L	2.34E+00	1.56E+00	8.54E+00		YES	YES	2.50E-01				3.96E-02	J			1.03E+00	J			1.26E-01	J		
Arsenic	mg/L	1.78E-02	4.00E-05	ND				ND				ND				ND				ND			
Barium	mg/L	1.27E-01	1.10E-01	2.30E-01		YES	YES	1.20E-01	J		YES	1.47E-01	J	YES	YES	3.46E-01		YES	YES	7.68E-01		YES	YES
Beryllium	mg/L	1.24E-03	3.12E-03	ND				ND				ND				ND				ND			
Cadmium	mg/L	2.51E-03	7.80E-04	ND				ND				ND				ND				ND			
Calcium	mg/L	5.65E+01	NA	5.46E+01				8.45E+01		YES		6.72E+01		YES		9.52E+01		YES		6.92E+01		YES	
Chromium	mg/L	NA	4.69E-03	1.17E-02			YES	ND				ND				ND				4.40E-03	J		
Cobalt	mg/L	2.34E-02	9.39E-02	ND				ND				ND				ND				3.38E-02	J	YES	
Copper	mg/L	2.55E-02	6.26E-02	5.90E-03	J			ND				ND				ND				ND			
Iron	mg/L	7.04E+00	4.69E-01	9.34E+00		YES	YES	1.81E+00			YES	7.53E-01			YES	2.34E+01		YES	YES	2.02E+00			YES
Lead	mg/L	7.99E-03	1.50E-02	1.60E-03	J			ND				ND				ND				ND			
Magnesium	mg/L	2.13E+01	NA	1.77E+01	J			2.87E+01	J	YES		1.92E+01				4.11E+01		YES		3.45E+01		YES	
Manganese	mg/L	5.81E-01	7.35E-02	2.27E-01			YES	2.96E-01			YES	1.10E-01			YES	1.03E+01		YES	YES	1.34E+01		YES	YES
Mercury	mg/L	NA	4.60E-04	ND				ND				6.30E-05	B			ND				6.10E-05	B		
Nickel	mg/L	NA	3.13E-02	1.03E-02	J			ND				ND				ND				ND			
Potassium	mg/L	7.20E+00	NA	4.20E+00	J			4.54E+00	J			2.79E+00	J			ND				1.03E+00	J		
Selenium	mg/L	NA	7.82E-03	ND				ND				ND				ND				ND			
Sodium	mg/L	1.48E+01	NA	9.03E+00				1.55E+01		YES		1.19E+01				ND				1.71E+01		YES	
Thallium	mg/L	1.45E-03	1.00E-04	4.70E-03	B	YES	YES	4.00E-03	B	YES	YES	4.40E-03	B	YES	YES	ND				5.70E-03	B	YES	YES
Vanadium	mg/L	1.70E-02	1.10E-02	2.80E-02	B	YES	YES	2.56E-02	B	YES	YES	1.13E-02	J		YES	ND				2.24E-02	J	YES	YES
Zinc	mg/L	2.20E-01	4.69E-01	1.95E-02	J			ND				ND				ND				ND			
VOLATILE ORGANIC COMPOUNDS																							
1,2,3-Trichlorobenzene	mg/L	NA	1.32E-03	ND				ND				ND				ND				ND			
1,2,4-Trichlorobenzene	mg/L	NA	1.35E-02	ND				ND				ND				ND				ND			
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	ND				ND				ND				ND				ND			
1,2-Dichloropropane	mg/L	NA	9.80E-04	ND				ND				ND				ND				ND			
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND			
1,4-Dichlorobenzene	mg/L	NA	1.75E-03	ND				ND				ND				ND				ND			
2-Butanone	mg/L	NA	7.14E-01	ND				ND				ND				ND				ND			
Acetone	mg/L	NA	1.56E-01	ND				ND				ND				4.80E-03	B			ND			
Benzene	mg/L	NA	1.40E-03	ND				ND				ND				ND				ND			
Bromomethane	mg/L	NA	2.17E-03	ND				ND				ND				ND				ND			
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				ND				ND				ND			
Chlorobenzene	mg/L	NA	1.62E-02	ND				ND				ND				ND				ND			
Cumene	mg/L	NA	1.27E-01	ND				ND				ND				ND				ND			
Ethylbenzene	mg/L	NA	1.40E-01	ND				ND				ND				ND				ND			
Hexachlorobutadiene	mg/L	NA	8.30E-04	ND				ND				ND				ND				ND			
Naphthalene	mg/L	NA	3.00E-03	ND				ND				ND				ND				ND			
Toluene	mg/L	NA	2.59E-01	ND				ND				ND				ND				ND			
Trichloroethene	mg/L	NA	4.50E-03	ND				ND				ND				ND				ND			
cis-1,2-Dichloroethene	mg/L	NA	1.55E-02	ND				ND				ND				ND				ND			
m,p-Xylenes	mg/L	NA	2.80E+00	ND				ND				ND				ND				ND			
n-Butylbenzene	mg/L	NA	9.57E-03	ND				ND				ND				ND				ND			
n-Propylbenzene	mg/L	NA	1.30E-02	ND				ND				ND				ND				ND			
o-Chlorotoluene	mg/L	NA	2.82E-02	ND				ND				ND				ND				ND			
p-Chlorotoluene	mg/L	NA	2.82E-02	ND				ND				ND				ND				ND			
p-Cymene	mg/L	NA	2.26E-01	ND				ND				ND				ND				ND			
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				ND				ND				ND				ND			
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				ND				ND				ND				ND			

Table 5-3

Groundwater Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date				FTA-29-GP06 AA3006 4-Dec-98				FTA-29-GP07 AA3020 8-Dec-98				FTA-29-GP08 AA3008 14-Dec-98				FTA-29-GP09 AA3009 8-Oct-98				FTA-29-GP10 AA3012 14-Dec-98			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
SEMIVOLATILE ORGANIC COMPOUNDS																							
1,4-Dichlorobenzene	mg/L	NA	1.75E-03	ND				ND				ND				ND				ND			
2-Methylnaphthalene	mg/L	NA	2.48E-02	ND				ND				ND				ND				ND			
Acenaphthene	mg/L	NA	6.58E-02	ND				ND				ND				ND				ND			
Di-n-butyl phthalate	mg/L	NA	1.48E-01	ND				2.30E-03	J			ND				ND				4.00E-03	J		
Dibenzofuran	mg/L	NA	4.34E-03	ND				ND				ND				ND				ND			
Fluorene	mg/L	NA	4.66E-02	ND				ND				ND				ND				ND			
Naphthalene	mg/L	NA	3.00E-03	ND				ND				ND				ND				ND			
Phenanthrene	mg/L	NA	2.81E-01	ND				ND				ND				ND				ND			
Phenol	mg/L	NA	9.31E-01	6.70E-03	B			5.00E-03	B			ND				2.80E-03	B			ND			
bis(2-Ethylhexyl)phthalate	mg/L	NA	4.30E-03	ND				ND				ND				ND				ND			

Table 5-3

Groundwater Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date				FTA-29-MW02 AA3013 9-Nov-98				FTA-29-MW03 AA3014 10-Nov-98				FTA-29-MW04 AA3017 9-Nov-98				FTA-29-MW04 AA3017R 17-Nov-98				FTA-29-MW05 AA3018 10-Nov-98			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																							
Aluminum	mg/L	2.34E+00	1.56E+00	1.02E+00				ND				2.51E-01				NR				ND			
Arsenic	mg/L	1.78E-02	4.00E-05	ND				ND				ND				NR				ND			
Barium	mg/L	1.27E-01	1.10E-01	ND				7.29E-01		YES	YES	1.33E+00		YES	YES	NR				3.12E-01		YES	YES
Beryllium	mg/L	1.24E-03	3.12E-03	ND				ND				ND				NR				ND			
Cadmium	mg/L	2.51E-03	7.80E-04	ND				ND				ND				NR				ND			
Calcium	mg/L	5.65E+01	NA	3.00E+01				3.53E+01				5.38E+01				NR				2.68E+01			
Chromium	mg/L	NA	4.69E-03	ND				ND				ND				NR				ND			
Cobalt	mg/L	2.34E-02	9.39E-02	ND				ND				ND				NR				ND			
Copper	mg/L	2.55E-02	6.26E-02	ND				ND				ND				NR				ND			
Iron	mg/L	7.04E+00	4.69E-01	1.26E+00			YES	2.04E+01		YES	YES	1.30E+01		YES	YES	NR				2.47E+01		YES	YES
Lead	mg/L	7.99E-03	1.50E-02	ND				ND				ND				NR				ND			
Magnesium	mg/L	2.13E+01	NA	1.35E+01				1.70E+01				1.77E+01				NR				1.21E+01			
Manganese	mg/L	5.81E-01	7.35E-02	4.55E+00		YES	YES	3.10E+00		YES	YES	5.17E-01			YES	NR				3.73E+00		YES	YES
Mercury	mg/L	NA	4.60E-04	ND				ND				ND				NR				ND			
Nickel	mg/L	NA	3.13E-02	ND				ND				ND				NR				ND			
Potassium	mg/L	7.20E+00	NA	ND				ND				ND				NR				ND			
Selenium	mg/L	NA	7.82E-03	ND				ND				ND				NR				ND			
Sodium	mg/L	1.48E+01	NA	8.53E+00				8.22E+00				1.41E+01				NR				7.70E+00			
Thallium	mg/L	1.45E-03	1.00E-04	ND				ND				ND				NR				ND			
Vanadium	mg/L	1.70E-02	1.10E-02	ND				ND				ND				NR				ND			
Zinc	mg/L	2.20E-01	4.69E-01	ND				ND				ND				NR				ND			
VOLATILE ORGANIC COMPOUNDS																							
1,2,3-Trichlorobenzene	mg/L	NA	1.32E-03	ND				ND				NR				3.30E-04	J			ND			
1,2,4-Trichlorobenzene	mg/L	NA	1.35E-02	ND				4.30E-04	B			NR				3.00E-04	J			ND			
1,2,4-Trimethylbenzene	mg/L	NA	6.00E-03	1.20E-04	J			ND				NR				1.70E-04	J			ND			
1,2-Dichloropropane	mg/L	NA	9.80E-04	ND				ND				NR				ND				ND			
1,2-Dimethylbenzene	mg/L	NA	2.80E+00	4.00E-04	J			3.40E-04	J			NR				1.40E-03				ND			
1,4-Dichlorobenzene	mg/L	NA	1.75E-03	ND				ND				NR				ND				1.60E-03			
2-Butanone	mg/L	NA	7.14E-01	ND				ND				NR				ND				ND			
Acetone	mg/L	NA	1.56E-01	ND				ND				NR				1.40E-02	J			ND			
Benzene	mg/L	NA	1.40E-03	ND				1.10E-04	J			NR				2.50E-04	J			ND			
Bromomethane	mg/L	NA	2.17E-03	1.90E-04	B			ND				NR				ND				1.50E-04	B		
Carbon disulfide	mg/L	NA	1.51E-01	ND				ND				NR				ND				ND			
Chlorobenzene	mg/L	NA	1.62E-02	ND				ND				NR				ND				1.70E-03			
Cumene	mg/L	NA	1.27E-01	ND				1.90E-03				NR				3.30E-03				1.80E-04	J		
Ethylbenzene	mg/L	NA	1.40E-01	2.70E-04	J			1.20E-04	J			NR				1.40E-04	J			ND			
Hexachlorobutadiene	mg/L	NA	8.30E-04	ND				ND				NR				2.70E-04	J			ND			
Naphthalene	mg/L	NA	3.00E-03	ND				3.10E-04	J			NR				2.80E-03	J			4.20E-04	J		
Toluene	mg/L	NA	2.59E-01	ND				1.30E-04	J			NR				1.50E-04	J			ND			
Trichloroethene	mg/L	NA	4.50E-03	ND				ND				NR				ND				1.40E-04	J		
cis-1,2-Dichloroethene	mg/L	NA	1.55E-02	ND				ND				NR				ND				1.90E-04	J		
m,p-Xylenes	mg/L	NA	2.80E+00	1.10E-03				3.90E-04	J			NR				7.50E-04	J			ND			
n-Butylbenzene	mg/L	NA	9.57E-03	ND				4.00E-03				NR				1.90E-03				2.20E-04	B		
n-Propylbenzene	mg/L	NA	1.30E-02	ND				1.40E-03				NR				4.20E-03				ND			
o-Chlorotoluene	mg/L	NA	2.82E-02	ND				ND				NR				6.80E-04	J			ND			
p-Chlorotoluene	mg/L	NA	2.82E-02	ND				ND				NR				2.40E-04	J			ND			
p-Cymene	mg/L	NA	2.26E-01	ND				ND				NR				1.30E-04	J			ND			
sec-Butylbenzene	mg/L	NA	1.06E-02	ND				4.60E-03				NR				2.90E-03				8.70E-04	J		
tert-Butylbenzene	mg/L	NA	1.14E-02	ND				1.40E-03				NR				1.40E-03				7.20E-04	J		

Table 5-3

Groundwater Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

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Sample Location Sample Number Sample Date				FTA-29-MW02 AA3013 9-Nov-98				FTA-29-MW03 AA3014 10-Nov-98				FTA-29-MW04 AA3017 9-Nov-98				FTA-29-MW04 AA3017R 17-Nov-98				FTA-29-MW05 AA3018 10-Nov-98			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
SEMIVOLATILE ORGANIC COMPOUNDS																							
1,4-Dichlorobenzene	mg/L	NA	1.75E-03	ND				ND				ND				NR				1.10E-03	J		
2-Methylnaphthalene	mg/L	NA	2.48E-02	ND				ND				ND				NR				ND			
Acenaphthene	mg/L	NA	6.58E-02	ND				2.20E-03	J			ND				NR				ND			
Di-n-butyl phthalate	mg/L	NA	1.48E-01	1.40E-02				3.60E-03	J			1.50E-02				NR				3.70E-03	J		
Dibenzofuran	mg/L	NA	4.34E-03	ND				ND				ND				NR				ND			
Fluorene	mg/L	NA	4.66E-02	ND				1.60E-03	J			ND				NR				ND			
Naphthalene	mg/L	NA	3.00E-03	ND				ND				1.60E-03	J			NR				ND			
Phenanthrene	mg/L	NA	2.81E-01	ND				ND				ND				NR				ND			
Phenol	mg/L	NA	9.31E-01	1.00E-03	B			1.70E-03	B			1.50E-03	B			NR				1.30E-03	B		
bis(2-Ethylhexyl)phthalate	mg/L	NA	4.30E-03	1.70E-03	J			ND				ND				NR				ND			

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

^b Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000b), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/L - Milligrams per liter

NA - Not available

ND - Not detected

NR - Analysis not requested

Qual - Data validation qualifier

Table 5-4

Surface Water Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

Sample Location Sample Number Sample Date					FTA-29-SW/SD01 AA2001 20-Oct-98					FTA-29-SW/SD01 AA2001R 29-Oct-98					FTA-29-SW/SD02 AA2002 20-Oct-98					FTA-29-SW/SD03 AA2003 20-Oct-98				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/L	5.26E+00	1.53E+01	8.70E-02	ND					NR					ND					3.68E-01				YES
Calcium	mg/L	2.52E+01	NA	1.16E+02	3.04E+01		YES			NR					3.12E+01		YES			3.52E+01		YES		
Iron	mg/L	1.96E+01	4.70E+00	1.00E+00	7.23E-01					NR					2.05E-01					9.50E-01				
Magnesium	mg/L	1.10E+01	NA	8.20E+01	1.15E+01		YES			NR					1.15E+01		YES			1.05E+01				
Manganese	mg/L	5.65E-01	6.40E-01	8.00E-02	2.29E-01				YES	NR					6.92E-02					2.62E-01				YES
VOLATILE ORGANIC COMPOUNDS																								
Acetone	mg/L	NA	1.57E+00	7.80E+01	NR					2.00E-03	B				1.50E-03	B				1.50E-03	B			
Bromodichloromethane	mg/L	NA	1.70E-02	1.10E+01	NR					2.00E-04	J				ND					ND				
Chloroform	mg/L	NA	1.69E-01	2.89E-01	NR					1.70E-03	B				4.20E-04	B				ND				
SEMIVOLATILE ORGANIC COMPOUNDS																								
Phenol	mg/L	NA	9.06E+00	2.56E-01	2.00E-03	B				NR					4.80E-03	B				2.20E-03	B			
bis(2-Ethylhexyl)phthalate	mg/L	NA	5.17E-02	3.00E-04	ND					NR					2.20E-03	J			YES	ND				

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama, July*.

^b Recreational site user site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000b), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, July*.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/L - Milligrams per liter

NA - Not available

ND - Not detected

NR - Analysis not requested

Qual - Data validation qualifier

Table 5-5

Sediment Analytical Results
11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7)
Fort McClellan, Calhoun County, Alabama

Sample Location Sample Number Sample Date Sample Depth (Feet)					FTA-29-SW/SD01 AA1001 20-Oct-98 0- .5					FTA-29-SW/SD02 AA1002 20-Oct-98 0- .5					FTA-29-SW/SD03 AA1003 20-Oct-98 0- .5				
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	8.59E+03	1.15E+06	NA	2.51E+03					2.99E+03					2.72E+03				
Arsenic	mg/kg	1.13E+01	5.58E+01	7.24E+00	8.60E+00				YES	4.40E+00					6.80E+00				
Barium	mg/kg	9.89E+01	8.36E+04	NA	2.56E+02		YES			8.06E+01					ND				
Beryllium	mg/kg	9.70E-01	1.50E+02	NA	6.40E-01					ND					6.50E-01				
Calcium	mg/kg	1.11E+03	NA	NA	9.61E+03		YES			5.28E+03		YES			3.67E+03		YES		
Chromium	mg/kg	3.12E+01	2.79E+03	5.23E+01	2.38E+01					2.17E+01					2.39E+01				
Cobalt	mg/kg	1.10E+01	6.72E+04	5.00E+01	1.76E+01		YES			1.00E+01					8.30E+00				
Copper	mg/kg	1.71E+01	4.74E+04	1.87E+01	1.87E+01		YES		YES	9.10E+00					9.50E+00				
Iron	mg/kg	3.53E+04	3.59E+05	NA	2.10E+04					1.48E+04					2.35E+04				
Lead	mg/kg	3.78E+01	4.00E+02	3.02E+01	3.41E+01				YES	3.49E+01				YES	1.85E+01				
Magnesium	mg/kg	9.06E+02	NA	NA	5.40E+03		YES			3.50E+03		YES			1.58E+03		YES		
Manganese	mg/kg	7.12E+02	4.38E+04	NA	2.33E+03		YES			4.68E+02					2.47E+02				
Nickel	mg/kg	1.30E+01	1.76E+04	1.59E+01	1.02E+01					1.00E+01					7.10E+00				
Selenium	mg/kg	7.20E-01	5.96E+03	NA	ND					ND					7.70E-01		YES		
Vanadium	mg/kg	4.09E+01	4.83E+03	NA	2.49E+01					6.30E+00					ND				
Zinc	mg/kg	5.27E+01	3.44E+05	1.24E+02	4.31E+01					2.99E+01	B				2.69E+01	B			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	6.23E+05	1.37E-01	9.20E-03	J				ND					ND				
Acetone	mg/kg	NA	1.03E+05	4.53E-01	1.30E-01	B				9.90E-02	B				5.90E-02	B			
Methylene chloride	mg/kg	NA	9.84E+03	1.26E+00	1.80E-02	B				1.20E-02	B				1.10E-02	B			
Naphthalene	mg/kg	NA	2.11E+04	3.46E-02	ND					3.50E-03	J				ND				
SEMIVOLATILE ORGANIC COMPOUNDS																			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	5.41E+03	1.82E-01	ND					ND					4.90E-02	J			

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

^b Recreational site user site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000b), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram

NA - Not available

ND - Not detected

Qual - Data validation qualifier

Volatile Organic Compounds. Twenty-nine VOCs were detected in surface and depositional soil samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Every detected VOC except trichlorofluoromethane was present in the sample from location FTA-29-DEP02. None of the remaining sample locations contained more than three of the detected VOCs and all but two of these results were flagged with a “B” data qualifier, indicating that these compounds were also detected in an associated laboratory or field blank. With the exception of the methylene chloride result, the VOC analytical results at sample location FTA-29-DEP02 were flagged with a “J” data qualifier, signifying that the result was greater than the method detection limit (MDL) but less than the RL.

None of the detected VOCs was present at a concentration exceeding residential human health SSSLs or ESVs.

Semivolatile Organic Compounds. Fifteen SVOCs were detected in surface and depositional soil samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Each of the detected SVOCs was present in the sample collected at FTA-29-GP01; SVOCs were not detected at sample location FTA-29-GP02.

Two SVOCs (benzo[a]pyrene and dibenz[a,h]anthracene) were detected in one sample (FTA-29-GP01) at concentrations exceeding residential human health SSSLs but below PAH background screening values for soils adjacent to asphalt. Also at sample location FTA-29-GP01, the concentrations of four SVOCs (anthracene, benzo[a]pyrene, fluoranthene, and pyrene) exceeded ESVs but were below PAH background screening values.

5.2 Subsurface Soil Analytical Results

Ten subsurface soil samples were collected for chemical analyses at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Subsurface soil samples were collected at depths greater than 1 foot bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-2.

Metals. Nineteen metals were detected in subsurface soil samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The selenium results were flagged with a “B” data qualifier, signifying that selenium was also detected in an associated laboratory or field blank.

The concentrations of five metals (aluminum, arsenic, chromium, iron, and manganese) exceeded

residential human health SSSLs. However, with the exception of aluminum (two locations) and manganese (one location), the concentrations of these metals were within background concentrations. The aluminum and manganese results were within the range of background values (Appendix H).

Volatile Organic Compounds. Thirteen VOCs were detected in subsurface soil samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The acetone and methylene chloride results were flagged with a “B” data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank. In addition, acetone and/or methylene chloride were the only detected VOCs at six sample locations (FTA-29-GP03, FTA-29-GP04, FTA-29-GP06, FTA-29-GP07, FTA-29-GP09, and FTA-29-GP10). None of the other detected VOCs was present at more than one of the sample locations. Sample location FTA-29-GP02 contained nine of the thirteen detected VOCs.

None of the detected VOCs was present at a concentration exceeding residential human health SSSLs.

Semivolatile Organic Compounds. Seventeen SVOCs were detected in the sample collected at FTA-29-GP02. SVOCs were not detected at any of the other subsurface soil sample locations. The benzo(a)pyrene concentration (0.31 mg/kg) exceeded the residential human health SSSL (0.0851 mg/kg) at one sample location (FTA-29-GP02).

5.3 Groundwater Analytical Results

Fourteen monitoring wells were sampled at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-3.

Metals. Twenty-one metals were detected in groundwater samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Beryllium, cadmium, and selenium were detected at only one sample location (FTA-29-GP01). Mercury was detected at six locations and thallium was detected at seven locations; however, the analytical results were flagged with a “B” data qualifier, signifying that these metals were also detected in an associated laboratory or field blank. Sample location FTA-29-GP01 contained each of the detected metals except thallium.

Thirteen metals (aluminum, arsenic, barium, beryllium, cadmium, cobalt, copper, iron, lead, manganese, vanadium, thallium, and zinc) were detected at concentrations exceeding both residential human health SSSLs and background concentrations. However, the majority of these metals were present in three samples (FTA-29-GP01, FTA-29-GP05, and FTA-29-GP06) that had elevated turbidity readings at the time of sample collection. As shown in Table 3-6 and in the purge records in Appendix A, the groundwater samples collected at sample locations FTA-29-GP01, FTA-29-GP05, and FTA-29-GP06 had markedly higher turbidity readings than samples collected at the other locations. Sample location FTA-29-GP01 (turbidity estimated at greater than 1000 NTUs) contained twelve of the thirteen detected metals exceeding both SSSLs and background concentrations. Sample locations FTA-29-GP05 (greater than 1,000 NTUs) and FTA-29-GP06 (greater than 700 NTUs) contained seven and five metals, respectively, of the thirteen metals exceeding SSSLs and background concentrations.

Based on the results of a groundwater resampling effort conducted by IT to evaluate the effects of turbidity on the concentration of metals in groundwater, high turbidity at the time of sample collection results in elevated concentrations of metals (IT, 2000c). The resampling effort demonstrated that the concentrations of most metals in the lower turbidity samples were significantly lower than in the higher turbidity samples.

This correlation indicates that suspended particulates contributed to the total concentration of metals detected in the groundwater samples collected at FTA-29-GP01, FTA-29-GP05, and FTA-29-GP06. Excluding the three high turbidity samples, the concentrations of six metals exceeded both SSSLs and background concentrations: aluminum (one location), barium (eight locations), iron (five locations), manganese (six locations), thallium (five locations), and vanadium (three locations). The thallium results were flagged with a “B” data qualifier, signifying that thallium was also detected in an associated laboratory or field blank.

Volatile Organic Compounds. Twenty-seven VOCs were detected in groundwater samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Chlorobenzene (FTA-29-MW05), 1,2,3-trichlorobenzene (FTA-29-MW04), 1,2-dichloropropane (FTA-29-GP05), 1,4-dichlorobenzene (FTA-29-MW05), 2-butanone (FTA-29-GP04), cis-1,2-dichloroethene (FTA-29-MW05), and hexachlorobutadiene (FTA-29-MW04) were each detected in only one of the samples. VOCs were not detected at five sample locations (FTA-29-GP03, FTA-29-GP06, FTA-29-GP07, FTA-29-GP08, and FTA-29-GP10). Sample locations FTA-29-MW04, FTA-29-MW03, and FTA-29-GP02 contained nineteen, twelve, and eleven, respectively, of the twenty-seven detected VOCs.

Naphthalene was the only VOC detected at a concentration (0.078 milligrams per liter [mg/L]) exceeding the residential human health SSSL (0.003 mg/L) at one sample location (FTA-29-GP02).

Semivolatile Organic Compounds. Ten SVOCs were detected in groundwater samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Phenol and/or di-n-butyl phthalate were the only detected SVOCs at eight sample locations (FTA-29-GP01, FTA-29-GP03, FTA-29-GP04, FTA-29-GP05, FTA-29-GP06, FTA-29-GP07, FTA-29-GP09, and FTA-29-GP10). The phenol results were flagged with a “B” data qualifier signifying that the compound was also detected in an associated laboratory or field blank. Dibenzofuran (FTA-29-GP02), 1,4-dichlorobenzene (FTA-29-MW05), 2-methylnaphthalene (FTA-29-GP02), bis(2-ethylhexyl)phthalate (FTA-29-MW02), and phenanthrene (FTA-29-GP02) were each detected in only one of the samples. Sample location FTA-29-GP02 contained six of the ten detected SVOCs.

Two SVOCs (2-methylnaphthalene [0.092 mg/L] and naphthalene [0.049 mg/L]) were detected at concentrations exceeding residential human health SSSLs at one sample location (FTA-29-GP02).

5.4 Surface Water Analytical Results

Three surface water samples were collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) at the locations shown on Figure 3-1. Analytical results were compared to recreational site user human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-4.

Metals. Aluminum, calcium, iron, magnesium, and manganese were detected in unfiltered surface water samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7).

None of the detected metals was present at a concentration exceeding recreational site user human health SSSLs. The concentrations of aluminum (one location) and manganese (two locations) exceeded ESVs but were within background concentrations.

Volatile Organic Compounds. Acetone, bromodichloromethane, and chloroform were detected in surface water samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7),

30(7), and 74(7). The acetone and chloroform results were flagged with a “B” data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank. Bromodichloromethane was detected only at sample location FTA-29-SW/SD01 and the analytical result was flagged with a “J” data qualifier, signifying that the result was greater than the MDL but less than the RL.

None of the detected VOCs was present at a concentration exceeding recreational site user human health SSSLs or ESVs.

Semivolatile Organic Compounds. Phenol and bis(2-ethylhexyl)phthalate were detected in surface water samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The phenol analytical results were flagged with a “B” data qualifier, signifying that phenol was also detected in an associated laboratory or field blank. Bis(2-ethylhexyl)phthalate was detected only at sample location, FTA-29-SW/SD02, and the analytical result was flagged with a “J” data qualifier, signifying that the result was greater than the MDL but less than the RL.

The phenol and bis(2-ethylhexyl)phthalate concentrations were below recreational site user human health SSSLs. The bis(2-ethylhexyl)phthalate concentration exceeded the ESV at sample location FTA-29-SW/SD02.

5.5 Sediment Analytical Results

Three sediment samples were collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). Samples were collected from the upper 0.5 foot of sediment at the sample locations shown on Figure 3-1. Analytical results were compared to recreational site user human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-5.

Metals. Sixteen metals were detected in sediment samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). None of the detected metals were present at a concentration exceeding SSSLs. The concentrations of arsenic (FTA-29-SW/SD01), copper (FTA-29-SW/SD01), and lead (two locations) exceeded ESVs. However, with the exception of the copper result, these metals concentrations were within background concentrations. The copper result was within the range of background values (Appendix H).

Volatile Organic Compounds. Four VOCs, including 2-butanone, acetone, methylene chloride, and naphthalene, were detected in the sediment samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The acetone and methylene chloride results

were flagged with a “B” data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank. Naphthalene (FTA-29-SW/SD02) and 2-butanone (FTA-29-SW/SD01) were each detected in only one of the sediment samples and the results were flagged with a “J” data qualifier, signifying that the result was greater than the MDL but less than the RL.

None of the detected VOCs was present at a concentration exceeding SSSLs or ESVs.

Semivolatile Organic Compounds. The SVOC bis(2-ethylhexyl)phthalate was detected at sample location FTA-29-SW/SD03 at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7). The analytical result was flagged with a “J” data qualifier, signifying that the result was greater than the MDL but less than the RL. The bis(2-ethylhexyl)phthalate concentration was below the SSSL and ESV.

Total Organic Carbon. Three sediment samples were collected and analyzed for TOC content. TOC content ranged from 2,450 mg/kg to 5,020 mg/kg. TOC results can be found in Appendix E.

Grain Size. Grain size distribution was determined in each of the three sediment samples collected. Grain size results can be found in Appendix E.

6.0 Summary and Conclusions and Recommendations

IT, under contract with USACE, completed an SI at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) at FTMC, Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. The SI at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) consisted of the sampling and analyses of four surface soil samples, two depositional soil samples, ten subsurface soil samples, fourteen groundwater samples, and three surface water and sediment samples. In addition, ten temporary monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and provide site-specific geological and hydrogeological characterization information.

Chemical analyses of samples collected at the 11th Chemical Motor Pool Area, Parcels 29(7), 30(7), and 74(7) indicate that metals, VOCs, and SVOCs were detected in the environmental media sampled. Analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metal concentrations exceeding SSSLs and ESVs were compared to media-specific background screening values (SAIC, 1998), and SVOC concentrations exceeding SSSLs and ESVs in surface and depositional soils were compared to PAH background screening values, where available (IT, 2000b).

Several metals were detected in site media (primarily surface and depositional soils) at concentrations exceeding ESVs and background concentrations. In addition, four SVOCs (anthracene, benzo[a]pyrene, fluoranthene, and pyrene) were detected in one surface soil sample and the SVOC bis(2-ethylhexyl)phthalate was detected in one surface water sample at concentrations exceeding ESVs. The concentrations of the four SVOCs in the surface soil sample were below PAH background screening values.

Five metals (aluminum, arsenic, chromium, iron, and manganese) were detected in surface/depositional and subsurface soils at concentrations exceeding SSSLs but within background concentrations or the range of background values (SAIC, 1998). The SVOC benzo(a)pyrene was detected at a concentration exceeding the SSSL in one subsurface soil sample (FTA-29-GP02). Benzo(a)pyrene was not detected in any of the other subsurface soil samples. VOC concentrations in surface/depositional, and subsurface soils were below SSSLs.

The potential impact to ecological receptors is expected to be minimal based on the existing viable habitat and site conditions. The site is a well-developed area, consisting of buildings and paved roads/areas interspersed with grassed areas. Viable ecological habitat is presently limited and is not expected to increase in the future land-use scenario. Consequently, the potential threat to ecological receptors is expected to be low.

In groundwater, several metals were detected at concentrations exceeding SSSLs and background concentrations. However, the majority of these metals were present in three samples that had high turbidity at the time of sample collection that likely influenced the results. Excluding the high turbidity samples, the concentrations of six metals (aluminum, barium, iron, manganese, thallium, and vanadium) exceeded SSSLs and background concentrations. Naphthalene (quantified as both a VOC and SVOC) and 2-methylnaphthalene were detected in one groundwater sample (FTA-29-GP02) at concentrations exceeding SSSLs. Naphthalene concentrations in existing monitoring wells (FTA-29-MW03 and FTA-29-MW04) adjacent to sample location FTA-29-GP02 were below the SSSL. 2-Methylnaphthalene was not detected in any of the other groundwater samples collected at the site.

Localized residual contamination associated with the former UST (FTA-29-GP02, FTA-29-MW03, and FTA-29-MW04) is present in subsurface soils and groundwater. Three chemical constituents (benzo[a]pyrene, 2-methylnaphthalene, and naphthalene) were detected at concentrations exceeding residential human health SSSLs at one sample location (FTA-29-GP02) located inside the UST excavation.

Based on the results of the SI completed at the 11th Chemical Motor Pool Area, IT recommends no further action with regard to additional investigation or remedial action by the U.S. Army. However, because of the presence of benzo[a]pyrene, 2-methylnaphthalene, and naphthalene in groundwater at concentrations exceeding residential human health SSSLs, the U.S. Army should consider placing restrictions on future land use that may result in human exposure to groundwater at Parcels 29(7), 30(7), and 74(7).

7.0 References

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ATTACHMENT 1

LIST OF ACRONYMS AND ABBREVIATIONS

APPENDIX A

SAMPLE COLLECTION LOGS
AND
ANALYSIS REQUEST/CHAIN-OF-CUSTODY RECORDS

APPENDIX B

BORING LOGS AND WELL LOGS

APPENDIX C

WELL DEVELOPMENT LOGS

APPENDIX D

SURVEY DATA

APPENDIX E

SUMMARY OF VALIDATED ANALYTICAL DATA

APPENDIX F

DATA VALIDATION SUMMARY REPORT

APPENDIX G

VARIANCES/NONCONFORMANCES

APPENDIX H

**SUMMARY STATISTICS FOR BACKGROUND MEDIA,
FORT MCCLELLAN, ALABAMA**